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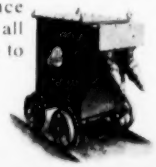

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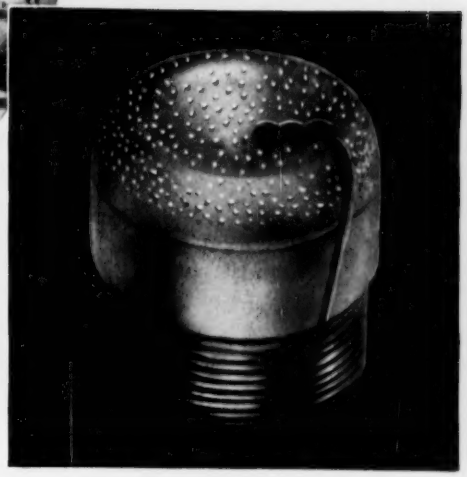

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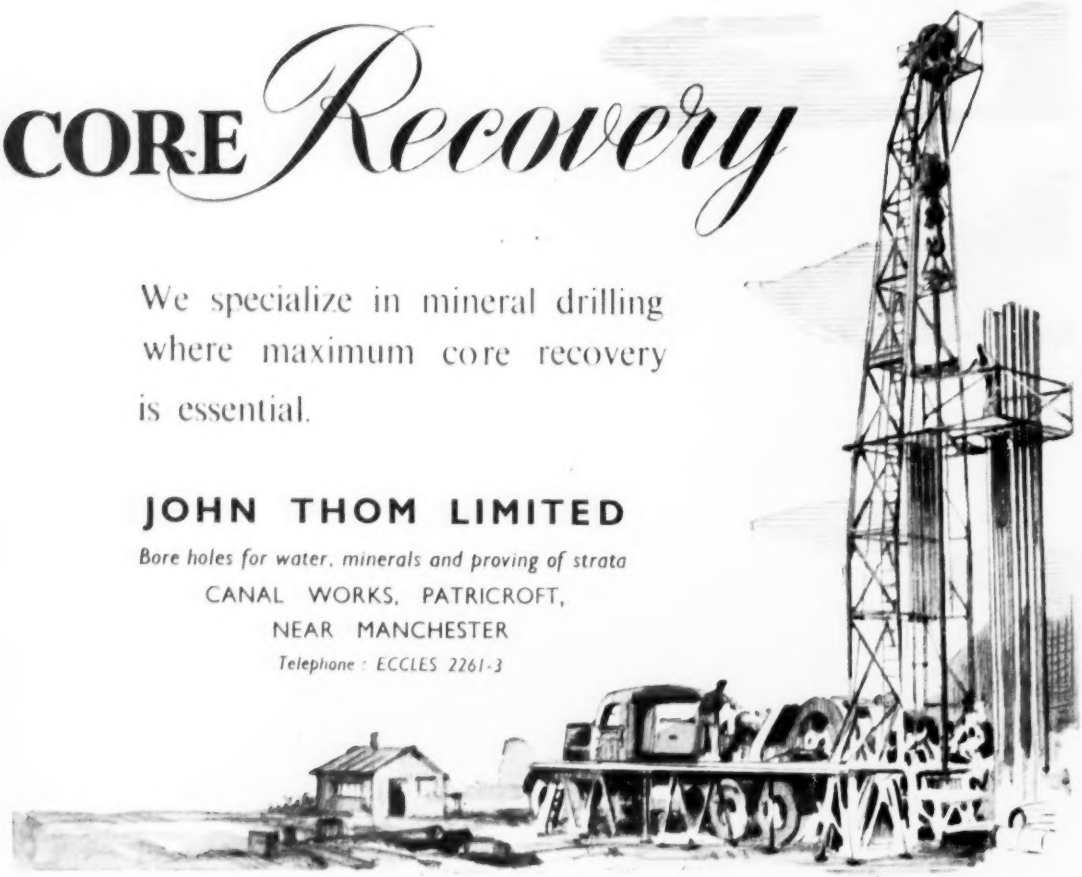

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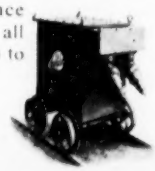

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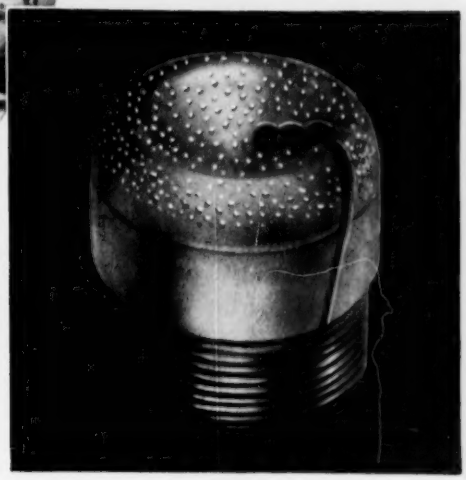

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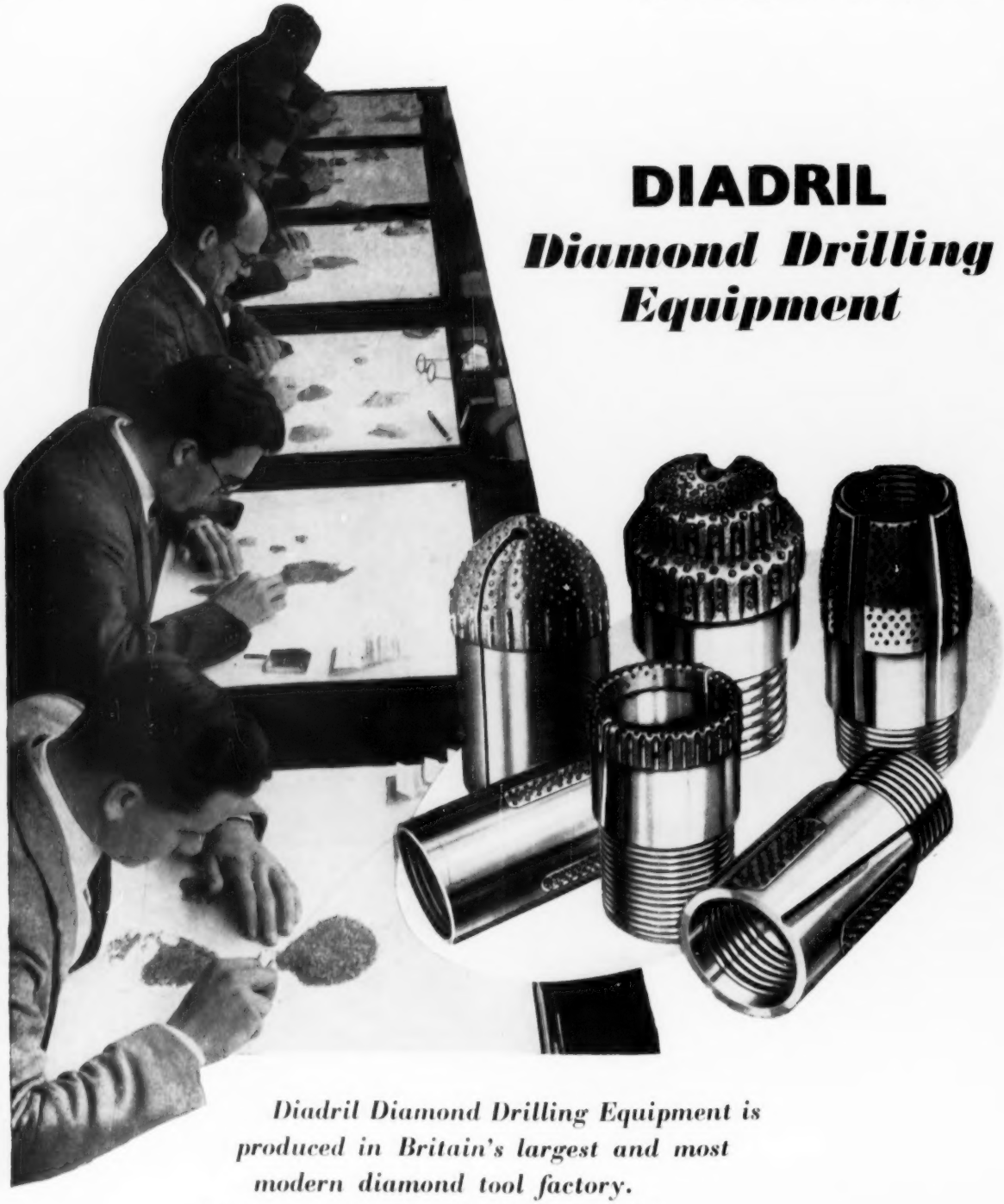

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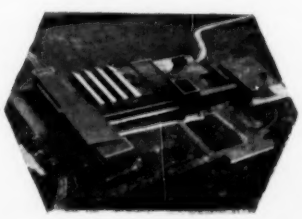

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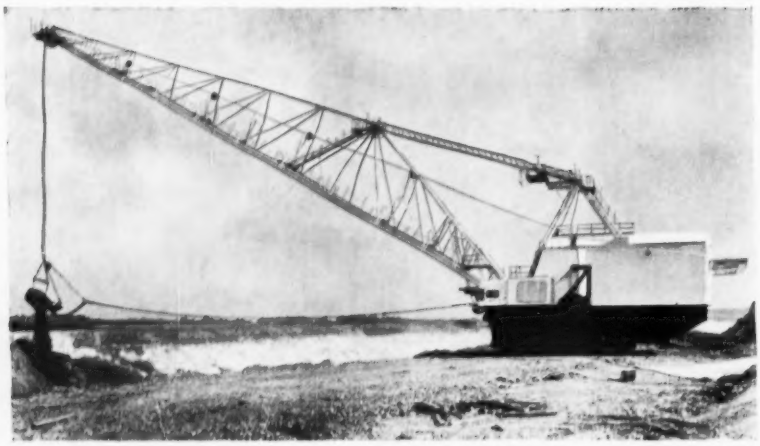

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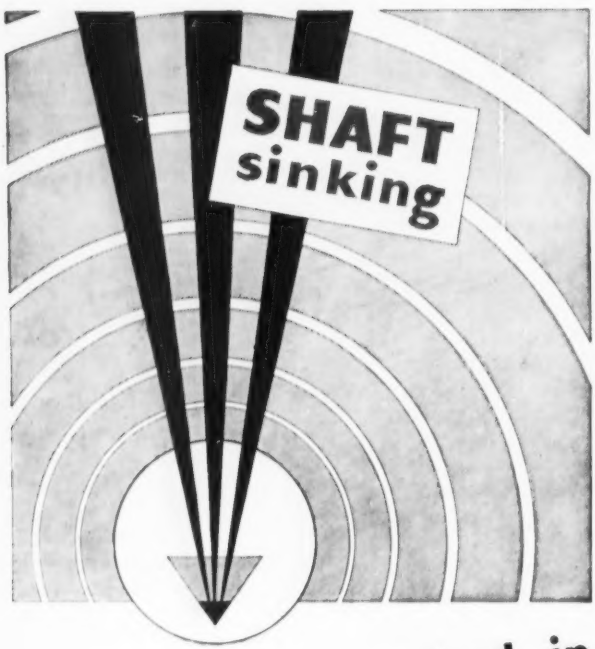

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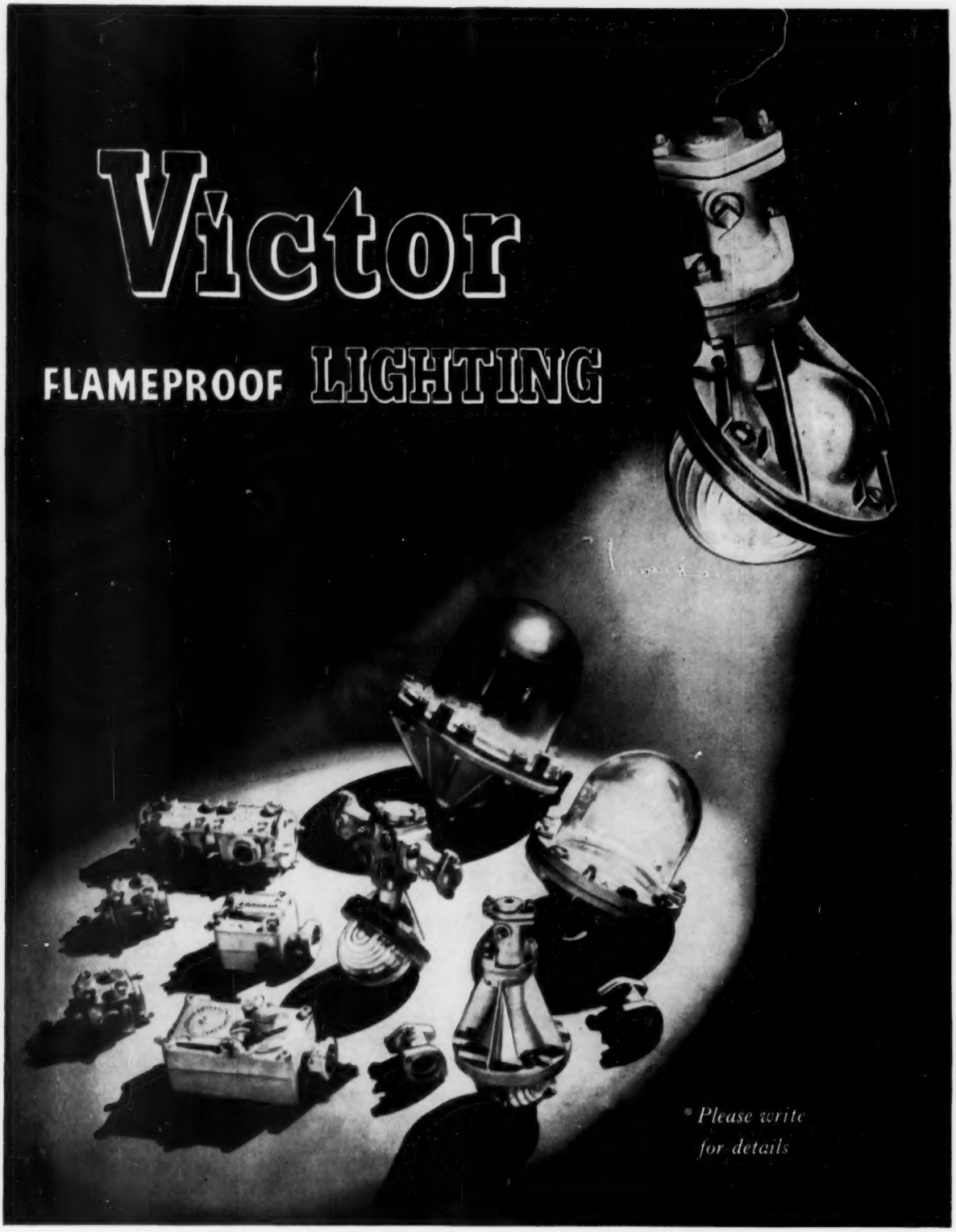

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NOTES AND COMMENTS

The Pricing and Marketing of Copper

It is early days yet to say whether the offer which has been made by some—but by no means all—Commonwealth copper producing interests to sell copper in the United Kingdom at stable prices and over fixed periods will come to anything. Certainly, it is easy to think of obstacles to its acceptance, but it would appear that the offers are being made in a purposeful manner and, whatever the outcome, they will have served a useful purpose, if they serve to stimulate thought on the general problems of marketing copper.

Most reports of these offers (and it is worth emphasizing perhaps that they are only reports and that the offers themselves have only been made in principle and subject to discussion) have tended to emphasize the instability of copper prices on the London Metal Exchange as the chief reason for the offers being made. If this is so, it seems suspiciously like attacking a symptom intead of a cause. Moreover, it has in our view, yet to be conclusively established that price instability is the main complaint against the London copper market and we believe that reports of dissatisfaction among consumers at the fluctuations of copper prices may well have been exaggerated.

In any event, even if we presuppose a marketing procedure which will ensure stable prices, we are still faced with the even more crucial question of the level at which prices are to be stabilized and it is difficult to avoid the conclusion that the reported fixed price offer to British consumers is primarily a reflection of the fluctuating struggle of recent years on precisely this issue between American copper interests and the Chilean government. Certainly Chileans have made plain their view that in the present world supply situation, copper is worth more than the 30 c. which the domestic U.S. producers are charging. American producers, however, cling to the view that 30 c. is high enough if copper is to remain competitive with alternative materials having a regard to the prospective increase in copper production. In the short term, they may, however, find it impossible to hold this level if the Copperbelt strike continues and the dock strike at San Antonio spreads to other Chilean ports.

When this perennial issue was put to the test by Chile in 1952 at a time when the U.S. domestic price was 24½ c., the Americans came very near to defeating the Chilean squeeze and there seems good reason to believe that if, in fact, a similar trial of strength were now once again to develop, the Americans, who have in the meanwhile made progress with the development of their government price support programme for domestic sub-marginal output, might expect to carry the day. At the same time it could well be a near thing (as the hold ups of 1952 and of last winter testify) and it would certainly be surprising if the Americans did not do everything possible to protect their flank by establishing a 30 c. basis as widely as possible amongst the world's major producers, against the day when Chile might be faced with the necessity of selling heavily in London in order to continue holding out on the American market.

Hitherto, although Chile has been selling freely at a premium on the Continent, very little Chilean copper has been coming to London—certainly insufficient quantities to have any appreciable effect on the differential between the London market price and the 30 c. level. If, however, when the need became compelling for Chile to sell in London, there were to be a considerable tonnage of copper already being sold at around £250 per ton it might well mean that L.M.E. price reaction to Chilean offers would be that much sharper and consequently that the amount of copper that Chile could offload at substantially above 30 c. would be correspondingly reduced.

The fact that there appears to be no unanimity of view amongst Commonwealth producers regarding the advisability of attempting to re-establish a 30 c. level is no doubt in part an indication of a divergence of view as to the extent of the danger which the present high prices hold for the long term marketing of copper in competition with substitutes, but is perhaps equally a divergence regarding the degree of harm which the establishment of pricing procedures divorced from the machinery of the L.M.E. may do to the London copper market.

Certainly it is a nice calculation whether the advantages to be gained by helping to spike the Chilean whole-hoggers would outweigh the disadvantages of possible lasting damage to the prestige of the London Metal Exchange. Presumably those producers who are making the fixed price offer are satisfied that their action will not be fatal to the latter and that once Chileans have been persuaded to come into line with American pricing policy, there will be time enough to turn to the problem of making the London copper market work.

This assumption, of course, presupposes that the producers do really need the services of the metal exchange, but this is a proposition which in the long term view we cannot suppose is in dispute. Under slump conditions—and even to-day these are not inconceivable!—the metal exchange unquestionably offers the best hope for the industry to dispose of its output in an orderly fashion. For consumers too, the exchange is an important safeguard, so much so that we understand that the fixed price contract proposals now being canvassed contain provision for an escape clause in the event of the market price falling substantially below the contract price.

If this reasoning is right, and if producers and consumers in their long term interests do genuinely need a copper exchange then the London Metal Exchange must be made to work. If, in consequence, the L.M.E. copper price is in the meanwhile a source of irritation—at least to some producers—it may be said that they themselves have not helped the exchange to establish a fully authoritative price, such as would have been achieved if a sufficient proportion of current production had been offered in the Ring. Certainly there seems to be no compelling reason why producers should continue to by-pass the L.M.E. completely. Even if it is accepted that at the present time all copper fed into the market would probably go straight out again, later on as and when supply gets easier a little will begin to stick and provide the beginnings of stockholding by the market.

Once the copper supply position can be eased to the point where the backwardation is eliminated, there will again be an inducement for consumers (at least those with adequate reserves) to carry stocks, and the market will doubtless also resume its traditional function as stockholder for those who cannot. Once that point is reached we can see no reason why the London copper market should not be made to work smoothly with or without a simplified copper contract. As things stand it seems unlikely that this position will be reached very rapidly and, in the meanwhile, it devolves upon those who wish to keep the machinery in being to nurse it along with as much consideration as possible.

On the vexed question of changed consumer habits in regard to stockholding, we believe there is no valid reason why the majority of consumers would not, as a practice, hold bigger stocks, if they could acquire them at what they felt to be the "right" price. It is true that most consumers cannot finance stocks of pre-war magnitude at copper's post-war price, but many could certainly without difficulty, and with great benefit, increase their stocks. In practice what is probably the principal deterrent to stocking up at present is the apparently universal belief among consumers—shared it would seem by some producers—that copper is too high and "must" come down. It may well be that in this frame of mind consumers may be reluctant to stock up even at 30 c. In other words the real enemy of producers, consumers and the Metal Exchange alike may not be price instability so much as the high level around which the price fluctuates.

What then *is* the right price for copper? The American producers certainly seem to believe it should not be higher than 30 c. but it has yet to be seen whether they may equally feel that it should not be less than 30 c. Mining costs have risen since 1952 when 24½ c. was an acceptable basis and doubtless the rise to 30 c. has brought out quite a bit of privately financed copper which would have been uneconomic at 24½ c., in addition, of course, to the new production stimulated by the government support programme. If the former tonnage was sufficiently large it could be that its loss, if the price went substantially below 30 c., might be enough to induce another crisis in supply.

In the absence of reliable figures, we can unfortunately do no more than speculate on this point. What, however, is certain is that early last year the American producers, under the threat of accumulated Chilean stocks and a falling off in domestic consumption, took prompt action to cut back production so that, from whatever motives, the 30 c. level was in fact held.

In any event it seems reasonably certain that the "right" price for copper to-day is not far short of 30 c., but it is difficult to escape the feeling that were the supply position such as to permit the price to drop to 28 or 29 c. (and to remain there for sufficiently long to establish general confidence in its stability), stockholding would become much more popular and the London copper market would at last have the opportunity of functioning in a normal manner.

Mr. Prain on Copperbelt Costs

It was so long since the Copperbelt experienced years of slump that there were few people in the industry who could remember hard times with the result that there was a marked unawareness of the importance of production costs stated Mr. R. L. Prain, President of the Rhodesian Selection Trust Group of Companies when he delivered the Henry Morley lecture on *The Copperbelt of Northern Rhodesia* to the Royal Society of Arts (Commonwealth Section) yesterday.

Nevertheless, mining costs in Rhodesia were increasing all the time not only because of mining at greater depths, tramming and hoisting over longer distances, and falling ore grades, but also because of the continuing process of inflation reflected in the rising costs of living, power and transportation. Indeed it was obvious that a rising standard of living for the African must cost more unless it was matched by increased productivity, mechanization and efficiency.

All these factors, he said, gave room for thought as to the competitive position of the industry within the world copper picture. On the other hand, he continued, there were two factors which operated in favour of the Rhodesian Copperbelt. One was that the inflationary process and all that it implied was occurring in other copper-producing fields; the other was that Copperbelt production costs contained a large variable cost element represented principally by the royalties payable. These were based on the copper price and therefore rose and fell directly with the price of copper thereby providing a certain amount of cushion against bad times. There were other elements of this sort, Mr. Prain said, and these tended to make the cost of production in Rhodesia difficult to compare with those of other countries.

Little Change in Total U.K. Coal Production in 1954

Although the total output of deep-mined coal in the United Kingdom in 1954 increased by 1,730,300 tons to 213,551,200 tons, production from opencast sources dropped by 1,454,200 tons to 10,243,900 tons so that the total coal output last year at 223,795,100 tons showed only a slight expansion on the 1953 figures of 223,519,000 tons.

The above provisional figures issued by the Ministry of Fuel and Power earlier this week provides thin cheer, particularly in view of the Coal Board's payment of higher wages last year on the understanding that an additional 5,000,000 tons would be produced during the year. The labour shortage—a decline of approximately 6,000 to 707,300 in the first 50 weeks of the year—together with the adverse weather conditions which limited operations at opencast coal sites—were the two chief causes for the failure of the miners to achieve their production target.

On the credit side, however, absenteeism was less last year, more shifts per week were worked, and the O.M.S. for the first 50 weeks of the year showed an improvement from 1.225 tons to 1.233 tons.

Tunnelling Records in South Africa and Scotland

Harmony's Tunnelling Record

During November-December, a mining crew at Harmony Gold Mining Company established a new underground tunnelling record when they cut 1,305 ft. of straight development work plus 87 ft. of subsidiary work in 26 working days. This achievement eclipsed the former record set up by Durban Roodepoort Deep by as much as 162 ft. (See *Mining Journal*, September 3, 1954.)

This was a remarkable accomplishment, not only for the substantial increase in distance driven but also because of the circumstances in which the operation was carried out. Firstly, in order to contend with any possible water trouble, pilot holes, initially 12 ft. and latterly 15 ft. long, were drilled during each round. This precaution does not normally have to be observed.

The second point was that the drive was started immediately the station crosscut was developed and the main grizzley installed. Consequently, there was no rehearsal time for the crew who started from scratch. Like all South African mines, and in contrast with American practice where specialist contractors with specialist equipment are employed for fast driving, officials and miners of Harmony were alone responsible for the job.

The size of the end was 11 ft. by 10 ft. (excavated) and it was driven from west to east through strata dipping from five deg. to seven deg. west. It started in hanging wall and intersected the Basal Reef.

The length of round drilled was 8 ft., using tungsten-carbide tipped drill steel 106 in. long. A drag round of 24 to 36 holes was drilled, using six Delfos Model R.H. 67 jackhammers on airlegs with a combination manifold drill carriage. The explosives used were 60 per cent 1¼ in. Ammon Gelignite and 60 per cent 1¼ in. Dynagel. In the beginning, electric detonators were used but after the first week these were replaced with igniter cord and safety fuse. According to mine officials, this latter method of firing gave better fragmentation and more convenient disposition of rock.

As with previous records, cleaning was done by a mechanical loader, in this case there was an Eimco Model 40 Rocker shovel working at an air pressure of 80 to 90 p.s.i. No spare loader was kept on the level and the one machine handled the whole 13,000 tons of rock broken. The only time allowed for maintenance was during the drilling round and on Sundays. The Eimco rocker shovel loaded the ore into ten 6-ton Granby cars which were hauled by two diesel locos, one 5-ton and the other 6-ton, and both rated at 30 h.p. The final layout in the haulage will require 80 lb. rails but during development a temporary 45 lb. track was laid. The extension rails employed were inverted 45 lb. rails using a special type of sleeper designed on the mine which proved to be very efficient.

To provide cover for the diamond drilling, recesses were cut at intervals on the sides of the haulage and, in addition to facilitating car changing, bays were cut to provide room for transfer devices. The total footage cut in these bays amounted to 87 ft., all of which were drilled, blasted and cleaned by the same crew.

The average operating cycle was drilling, 1 hour ; cleaning, 1 hour ; charging and blasting, ½ hour ; and re-entry period, ½ hour, or three hours in all. The best cycle of operation achieved for an 8 ft. advance was 2 hours 5 minutes. The best advance in one day was 64 ft. and the best continuous advance over six days was 350 ft.

During the first 13 days, 588 ft. were accomplished and in the second half of the period 717 ft. This latter figure shows clearly the improvement made by the mining crew as they became more efficient. The crew consisted of three developers, three equippers and one tracklayer, supervised by three shift bosses under a mine captain.

European Tunnelling Record

During seven working days—December 12-19, a tunnelling crew comprised largely of Poles with a sprinkling of Irishmen, shattered the existing European tunnelling record by driving a tunnel 10 ft. in dia. a distance of 428 ft. in seven days through very hard epidiorite rock.

This achievement was recorded on the St. Fillans section of the North of Scotland Hydro-Electric Board, Breadalbane Project, the contractors for which are the Mitchell Construction Company working in collaboration with the Consulting Engineers, Sir M. McDonald and Partners. This low pressure tunnel, known as the Glen Almond Tunnel, will be 17,200 ft. in length when completed ; has a 10 ft. bed width, and a gradient of 1 in 200.

The tunnelling crew were in their 17th week in this particular heading and were working two shifts from 8 a.m. to 8 p.m., six days a week. When, however, it was intimated that a European record achievement was in sight the crew decided to work through a complete seven days. During the seven days 66 rounds were fired and 18,300 ft. were drilled. Each round averaged 7 ft. 10 in. and 35 holes. The amount of explosives per round averaged 140 lb. Polar Ammon Gelignite, blasting being carried out by .5 second delay detonators.

The average cycle of operations was 2½ hours an analysis of which showed that drilling time took 50 minutes; charging and blasting 15 minutes ; re-entry time for allowing smoke to clear 15 minutes, and mucking 70 minutes. The best time achieved for one complete cycle of operations was one hour-and-a-quarter.

The tunnelling crew which established the record totalled 36 men of which two teams of 16 worked the day and night shifts and there were four additional permanent day crew. The breakdown of the gangs is given below :

Both shifts 16 men each		*Permanent day*
1 Shift Boss	1 Electrician	1 Foreman
1 Eimco Driver	1 Compressor Man	1 Drill Doctor
2 Loco Drivers	1 Handyman	1 Fitter
6 Machine Men	1 Plate Layer	1 Powder Monkey
2 Tip Men		

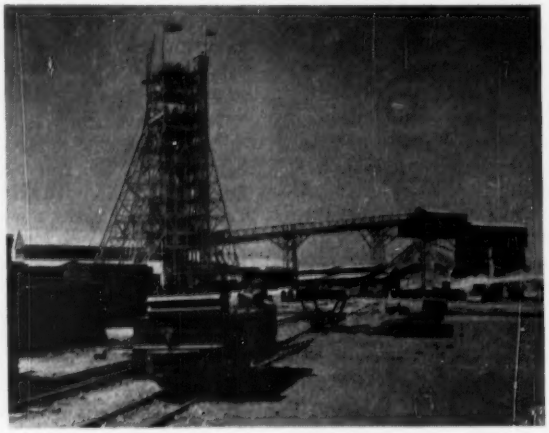
The equipment essential to the operation comprised 1 " Eimco 21 " rocker shovel on the face which shifted 21 cu. yd. per round. The Eimco 21 worked on rail track having a 2 ft. gauge. Atlas RH656-4W drills, six in number (two held in reserve but not required) were employed. Each drill weighed 45 lb., was mounted on a pusher leg and had a piston dia. of 65 mm. Coromant Tungsten carbide tipped steels with ⅞ths hollow hexagonal sections with a tipped dia. of 38 mm. were used. It is reported that these coromant steels were each averaging roughly 1,000 ft. the insert wearing to wafer thickness without the steels breaking. One diesel loco and two jubilee skips were used. At the intake end driving has advanced about 300 ft.; thus the break through is not expected for about another 15 months.

S.A. MINING TRENDS—VII

Current Mining Practice at Merriespruit (Orange Free State) Gold Mining

Merriespruit (Orange Free State) Gold Mining Company, the Orange Free State gold/uranium developing mine in the Anglo-Transvaal Group, was registered in South Africa in June, 1949, and is scheduled to come into production some time this year. In the following article, which has been specially contributed to *The Mining Journal* by a South African correspondent, due weight has been given to the remarkable shaft sinking progress achieved at the mine, before discussing the gold reduction plant and the increasing attention being paid to waste sorting. In conclusion there is a brief description of the mill. This article is the sixth of eight so far published describing current mining practice in at least one mine in each of the chief South African Groups.

The initial stages of opening up and developing the Merriespruit mine will be accomplished from two shafts, slightly more than 6,000 ft. apart more or less on dip. Both shafts are vertical, circular 24 ft. 1 in. dia., and concrete-lined. The western shaft, No. 1, will have a final depth of about 4,520 ft. Sinking at this shaft was suspended some time ago at a depth of 3,771 ft. to facilitate the start of preliminary development, including the driving of the haulage to connect both the shafts. Development from the No. 1 Shaft was recently reported as proceeding on five levels; and with satisfactory progress having apparently been achieved, it has been decided to resume sinking the shaft to its final depth in the current quarter of the year.



The bank layout is typical of the Merriespruit arrangement. The belt conveyor gantry from headframe bins to development rock silo and the waste rock silo

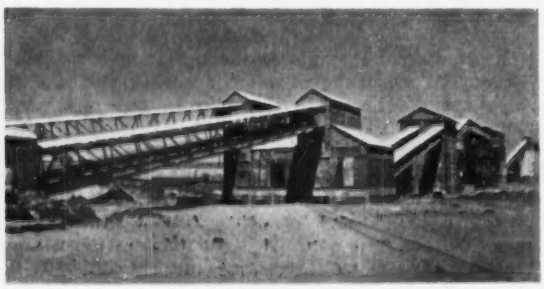
SHAFT SINKING RECORD

Sinking operations in the No. 2 Shaft were resumed in April, from the depth of 97 ft. previously advanced. By the end of September a depth of 1,657 ft. had been reached with the monthly advance averaging approximately 312 ft. This included the world record of 597 ft. for all types of shafts achieved in the June month. The formations traversed were Karroo shales.

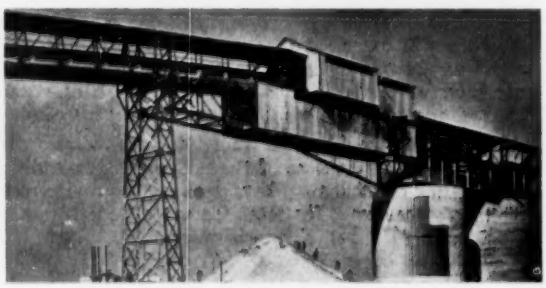
The sinking achievement was made possible by intensive organization and the use of an air-operated cactus-type grab mounted on a multi-deck sinking stage. The combination of these is considered capable of a monthly advance of as much as 650 ft. under favourable conditions. In general, the benefits can be summarized as facilitating the maintenance of about double the normal sinking rate with about half the usual native labour complement. The June sinking rate was equivalent to 19.9 ft. a day over the excavated circular dia. of about 26 ft. This is reduced by the concrete-lining, which is placed concurrently with sinking, to 24 ft. 1 in. The Basal Reef is expected to be intersected in the shaft at a depth of about 3,300 ft. approximately 400 ft. above the final projected depth. The two shafts are expected to be connected by about mid-1955.

DEVELOPMENT ON REEF

The Basal Reef horizon was intersected in 12 boreholes out of the 20 drilled on and close to the lease area, the depths disclosed being relatively shallow. Including the higher or highest value in each borehole where more than one intersection was made, the average value for the Basal Reef is 461.5 in. dwt., equivalent to 11.53 dwt. over an assumed width of 40 in. From the start of reef development to September 30 this year, 5,810 ft. were sampled, 3,790 ft. or 65.2 per cent proving payable averaging 349 in. dwt., equivalent to about 8.73 dwt. over an assumed width of 40 in. It would appear that for the most part reef development so far advanced has been in a grade zone not representative of the highest values likely to be disclosed in certain sections of the property. So far reef development has been confined to the No. 1 Shaft area. At this stage of Merriespruit's development, with milling some 12 months off, it may be premature to comment on the methods of stope preparation and of mining that may be adopted. Although waterbearing fissures have retarded



The reduction sequence at Merriespruit. From left to right, primary grizzly and crushing sections, screening section, and sorting, secondary and tertiary crushing sections



Close up of the conveyor assembly from headframe to development rock silo. Ore will drop from the gantry at the enclosed portion to the stockpile

development to the present and seem likely to be encountered as often in the future, there are the favourable geological conditions in the good width of reef disclosed in the boreholes, and in current development and in the absence of the khaki shale.

URANIUM PRODUCER

Official confirmation of Merriespruit's entry into the list of uranium producers was given in October last year. Under arrangements made with the Atomic Energy Board of South Africa the company is to erect a plant to produce uranium and pyrite-bearing concentrates from the residue slimes of its gold production plant which should reach operation some time this year. Concentrates so produced will then, as from about the end of 1955, be pumped to the adjoining property of Virginia where plants are being erected to extract uranium and to produce sulphuric acid. One aspect of unofficial reports concerning this association is that pyrite concentrates produced will include the bulk of the uranium content of the reef to be exploited, namely the Basal Reef. The production of these concentrates would, of course, involve the erection of a flotation plant. The output would probably be treated for the uranium content as well as the sulphur, required for the processing of sulphuric acid, in the Virginia plants. In the absence of official announcements, these forecasts must naturally be regarded as conjectural at this stage.

A general view of the treatment plants at the Virginia mine

GOLD PRODUCTION THIS YEAR

The erection of the gold reduction plant is now in progress, and the initiation of milling is due to commence sometime this year. This plant may be located at the No. 1 Shaft. From the headframe, belt conveyors will transfer the hoisted ore to two stockpiles with a total capacity of 8,000 tons. Ore from the other shaft will be hauled on surface tracks to this site. Waste rock will also be transferred from the headframe by belt conveyors to a reinforced-concrete silo whence it will be delivered to the dump, while reef development rock will be similarly conveyed to a separate silo of the same type.

REDUCTION SEQUENCE

From the stockpiles the ore will be conveyed to the primary crushing stage and thence to the grizzleys and screens of the secondary and tertiary crushing sections. Following grading into various sizings on the grizzleys and screens, and washing on the belts, waste sorting of the plus 2 in. cut will be effected to the extent of about 15 per cent. The balance will be reduced to minus ¾ in. by the secondary and tertiary cone crushers, while a portion of the screened products will be drawn off from the circuit for use as grinding pebbles in the secondary milling circuit. The fines washed from the ore after separation on the grizzleys and screens will be classified and dewatered in spiral classifiers, the overflow being pumped to the secondary milling circuit, and the dewatered underflow or coarse product being combined with the minus ¾ in. ore from the screens.

It may be mentioned here that increasing attention is now being paid to the cost per f.oz produced as the yardstick of operating results. In line with this tendency is the practice of waste-sorting in order to reduce to a minimum the waste rock in the mill feed which, of course, beneficiates the grade milled.

DEVELOPMENT ROCK PROCESSING REEF

The reef development rock, which will amount to relatively small tonnages totalling about 15 per cent of the total hoisted during the primary development of the mine, will be conveyed from the designated silo to a reef-picking assembly housed in the primary crushing section. There it will be screened into three sizings. Reef will be hand-picked from the coarsest sizing to an anticipated extent of 20 per cent of the total reef development rock tonnage, the intermediate sizing will be discarded and conveyed to the waste dump, and the fines which are expected to contain economic values, will be combined with the flow to the following stages of crushers. This operation is, in effect on the grade milled, waste-sorting in reverse. The final crusher section product, minus ¾ in., will be sent to the mill bins and drawn off for milling and cyanidation.

The mill will be arranged in units. Each of these has a nominal capacity of 37,500 tons a month, and consists of one primary open-circuit rod-mill and four secondary pebble mills in closed circuit with hydrocyclone classifiers and plane tables. The application of the hydrocyclone as a closed-circuit classifier to Rand practice was initiated at the Rand Leases mine which, like Merriespruit, is in the Anglo-Transvaal group.

THE PLANE TABLE IN CONTINUOUS CONCENTRATION

The plane table was developed at the Rand Leases mine as well. M. J. Dennehy, who also was responsible for the development of the plane table) and S. K. de Kok describe the processes of applying the hydrocyclone to Rand practice in *The Journal of The Chemical, Metallurgical and Mining Society of South Africa*, Vol. 53, No. 9. The plane table—a continuous concentrating device—was described by T. Zadkin in the same Journal, Vol. 54, No. 8. The overflow from the hydrocyclone classifiers will constitute the final product from the mill and the feed to the cyanidation section.

Initially two milling units will be installed in the Merriespruit reduction plant, with provision made for the installation of an additional two units. The total nominal milling capacity of the four units will be 150,000 tons a month. The concentrate from the secondary circuit plane tables will be reconcentrated on a continuous corduroy mechanically operated table. The tailings from the latter will be returned to the secondary milling circuit and the concentrate will be transferred to the amalgam section. There the gold and osmiridium will be recovered.

World Resources of Lithium—II

In the following article, the concluding one of two instalments, the lithium resources of South and South-West Africa and Southern Rhodesia are surveyed, and a brief exposition of the metal's uses and market outlets from both a military and an industrial viewpoint are given. The first part of the article, published in our issue of December 31, 1954, described North American sources of lithium supply.

Although local sales and exports of lithium minerals from the Union of South Africa have hitherto been negligible, considerable interest has been taken in ores found in the Steinkop Reserve, Namaqualand. A production of 60 tons was reported for 1953 and exports totalled 37 tons.

Lithium-bearing minerals are widely distributed throughout the pegmatite area of Namaqualand in the form of spodumente, lepidolite, lithiophilite and triphylite. Of these only spodumene occurs in exploitable quantity, the others being accessory. Lepidolite, while quite abundant in smaller quantities, has nowhere been found in large masses comparable to those occurring in the Karibib district of South-West Africa.

Spodumene, on the other hand, is present in appreciable quantities in quite a number of localities, logs several feet long and almost a foot wide being quite common. Deposits are distributed along an east-west line within a road distance of approximately 30 miles. The ore reserves cannot as yet be estimated, but from existing prospecting pits and surface indications, the most promising sites appear to be those at Spodumenekop, Jackalswater and Norrabees.

Samples of spodumene from these sites were found to have the following lithia contents :

(a) fresh crystals 7-6.3 per cent Li_2O ;
(b) cobbings of mass sample 6.4 per cent Li_2O ;
(c) weathered outer crust of crystals 4.3 per cent Li_2O.

SOUTH-WEST AFRICA

Lithium was first discovered in South-West Africa in 1927, the finder being Mr. F. J. Jooste, who was working a claim near Albrechts Siding for cassiterite. Samples of the ore were examined by the Mines Department in Windhoek and were recognized to contain a substantial percentage of lepidolite. The successful sale of this mineral in Germany by the Damara Mining Company, towards the middle of 1930, led to an almost feverish search for lepidolite claims, which abated the following year owing to the difficulties of marketing the ore overseas.

It has been established that igneous rock contains 0.008 per cent Li_2O. Having regard to the vastness of the granitic intrusions in central Damaraland and its surroundings, it is not surprising that there should be widespread deposits of lithium ore, representing the lithium concentration from a tremendous weight of acid igneous rocks.

The most important lithium occurrences in South-West Africa are those situated to the east, south-east and south of the town of Karibib. The principal ores in the order of abundance are lepidolite, petalite and amblygonite.

Eight small lepidolite occurrences have been found scattered over a wide area in and around the Erongo Mountains. The largest single mass measured 51 ft. x 9 ft. on the surface. A deposit of lepidolite has also been found on Kinderzitt Warmbad, where an isolated large pegmatite occurs in gabbro. This deposit is located some 50 miles from Karesburg, the nearest rail point.

Mining presents no difficulties, since it is unlikely that any of the orebodies will be worked beyond the quarrying stage for many years. The initial treatment of the ore is also a simple matter. The only impurity that can be economically removed at the quarries is the quartz inset, this being done by coarse crushing and hand sorting. Mining and treatment costs are therefore low, while road transport over the comparatively short distances involved is not prohibitive. Individual deposits are from 6 to 20 miles from rail and Karibib is 134 miles by rail from the port of Walvis Bay. The largest producer is Jooste Lithium Myne (Bpk), which has extensive reserves of lepidolite and it has even been suggested that it may have larger reserves of petalite.

Analyses of a number of samples from various deposits in South-West Africa gave from 1.07 to 6 per cent of lithia, the average being 3.95. If the ores are hand picked a payable grade can readily be maintained. Rubidium and caesium are present in some deposits.

Last year South-West Africa produced 338 s.tons of amblygonite (6-8 per cent Li_2O), 8,443 tons of lepidolite (3-3.6 per cent Li_2O) and 1,598 tons of petalite (3-4 per cent Li_2O). The corresponding figures for 1952 were 714, 7,914 and 1,174 tons. Of last year's shipments 45 tons of amblygonite, 9,083 tons of lepidolite and 1,481 tons of petalite went to the United States. West Germany purchased 344 tons of amblygonite and 280 tons of lepidolite, Holland 31 tons of amblygonite and 60 tons of lepidolite, and the United Kingdom 29 tons of amblygonite.

SOUTHERN RHODESIA

The largest known concentration of lithium ores is on the Bikita tin field, about 45 miles east of Fort Victoria. Lithium ores are also found in the Salisbury and Shamva tin-bearing areas of Mashonaland and in the Filabusi district of Matabeleland. A rich deposit of amblygonite was located on the Miami mica field and was mistaken for beryl. Several deposits of petalite have recently ben discovered in the Enterprise tin belt about 20 miles from Salisbury.

Amblygonite, lepidolite, spodumene and petalite are all found on the Bikita tin field. The greatest concentration is in the southern part of the field, and occurs in a pegmatite dyke about 2,000 yd. long and 900 ft. wide on the average, which strikes north and south and gradually tapers southwards until it pinches out. This large body, which appears to dip eastward at a high angle, contains workable quantities of the lithium minerals.

Lepidolite has been won from an old quarry, known as the "Bikita quarry," that was originally worked for tin. The faces and floor of this quarry are formed almost entirely of a pale, lilac-coloured and fine-grained lepidolite mixed with a little quartz, its extraction being a comparatively easy matter. The mineral occurs in small quantities all over the tin field and forms a conspicuous capping of a small hill, 2,800 yd. north of the Bikita quarry, known as the "Mauve Kop" on account of the unusually deep mauve colour of the lepidolite.

Amblygonite occurs in small, irregular masses, as does the spodumene, but petalite occurs in a large mass to the north of the Bikita quarry, measuring about 500 yd. long and between 100 and 200 ft. wide, as well as in small masses elsewhere.

The total production of lepidolite in Southern Rhodesia up to the end of 1951 is recorded as 2,346 tons valued at £10,108, of which nearly 2,000 tons came from the Bikita tin field, the remainder being from deposits in the Salisbury and Umtali districts. Up to the same date, 105 tons of amblygonite had been produced from the Bikita tin field.

Last year Southern Rhodesia's exports of lithium minerals were valued at £150,000, this figure being more

than twelve times the aggregate for the previous year when 1,866 tons of lithium minerals were shipped overseas. They comprised 336 tons of amblygonite, 11,580 tons of petalite, and 7,682 tons of lepidolite. Even these quantities, impressive though they are, are greatly exceeded in the returns for the current year, which show that up to the end of September production totalled 161 tons of amblygonite concentrates, 16,865 tons of petalite, and 19,324 tons of lepidolite.

NEW LITHIUM PROJECT

The chief factor in the expansion of Rhodesian production is the progress of Bikita Minerals (Private) Ltd., which last year exercised options over large deposits of high-grade litium-beryllium ores. Work at Bikita has been concentrated on the production of lepidolite for immediate sale to glass manufacturers and other users in the United States, the Continent, and Britain. The mine is being developed to increase the tonnage of lepidolite for sale abroad and also to provide ore for treatment in a chemical plant.

Production has been stepped up very rapidly and now exceeds 2,000 tons a month of lithium ores, according to the returns issued by the Chamber of Mines of Rhodesia. This compares with a return of 225 tons for January of the current year.

Selection Trust is responsible for the technical management of Bikita Minerals, besides holding a 40 per cent interest in the company. Trepca Mines, as a result of its agreement with Selection Trust, has a 10 per cent interest in the company. The American Potash and Chemical Corporation are associated with Selection Trust in the development of the business and are also participating in the financing of the enterprise, together with the American Metal Company.

It was recently announced that arrangements had been completed for the formation of a new company in the U.S. called American Lithium Chemicals, the control of which will be held as to 50.1 per cent by the American Potash and Chemical Corporation and the balance by Bikita Minerals. Plans have been formulated for the manufacture of lithium chemicals at a new plant to be erected at San Antonio, Texas. The lithium ores for this plant will be supplied by Bikita. It is believed that the total capital requirements of the new American lithium company and the Bikita property will amount to somewhere in the region of $8,000,000.

INDUSTRIAL USES

Lithium has an atomic weight of 6.94, a specific gravity of 0.543, and a melting point of 180 deg. C. It is less volatile than sodium or potassium, but belongs to the same class of alkaline metals.

In recent years systematic research has revealed many applications for the metal, its alloys, salts and ores, and despite the publicity which lithium has received in connection with the development of the hydrogen bomb, American producers expect to sell over 80 per cent of their output this year to civilian industry. The first major industrial use was in alkaline type electric storage batteries, but at present the greatest volume of consumption of lithium compounds is in multi-purpose greases, porcelain enamel frits, and certain types of glass.

Lithium greases, developed during the war for efficient lubrication at temperatures from 60 to 120 deg. F., have found extensive peacetime uses. Lithium fluoride and chloride are in demand for aluminium-welding fluxes and the chloride is used in air conditioning units to control humidity. Several compounds, as well as the metal itself, are being used in organic synthesis work.

As the lightest known metal, three times as light as magnesium, lithium is viewed with considerable interest by the aircraft industry. Despite the low melting point, it is probable that a lithium base alloy having reasonably good strength and ductility could be developed. Unfortunately, lithium reacts with moisture in the air or with immersion sufficiently readily to render it unsuitable for use except in an inert atmosphere or in dry air. No practical means has yet been found for protecting it by cladding, nor is any lithium-rich alloy so far in sight.

On the other hand, the prospect for using lithium as a minor alloying element is much brighter. Since lithium actively alloys with many metals and is also a good deoxidizer, metallurgists are carrying out considerable research in this direction.

Apart from its thermonuclear importance, lithium has military uses which caused it to be ranked as a strategic material during the second world war. Both lithium hydride and lithium borohydride have been used as sources of hydrogen for war purposes; 1 lb. of the hydride will yield 22.5 cu. ft. of the gas, but the borohydride is claimed to give 66 cu. ft. per lb. The use of these compounds to inflate antennae balloons is the most concentrated method of transporting hydrogen. Some work was done during the second world war in using the hydride as a submarine fuel by burning with tank oxygen. The hydroxide in powder form absorbs large volumes of carbon dioxide; it has therefore been used as an air purifier in submarines and has been an ingredient in respirators for military-plane pilots. Lithium hydride and lithium nitrate are used in military operations for rescue and signal work.

ATOMIC USES

Lithium, the material used by Sir John Cockroft in 1932 to produce the first artificial splitting of the atom, is now reported to be playing a key part in the production of hydrogen bombs.

According to a well-informed contemporary,[2] ordinary hydrogen is not suitable for use in thermonuclear explosives and the principal constituent must be deuterium—"heavy hydrogen" of mass 2. Heavy hydrogen by itself, however, has too high an ignition temperature to be successfully detonated by an ordinary atomic bomb. A possible solution is to add tritium (hydrogen of mass 3) as a "primer." Tritium must be manufactured from lithium in special atomic piles, and is therefore exceedingly expensive. Moreover a complete hydrogen liquefaction plant, maintaining a temperature close to the absolute zero, is required to concentrate the materials sufficiently.

It is suggested that a much more simple solution—if it works—is to use the material lithium-6 deuteride as the thermonuclear explosive. Lithium deuteride is a solid, so this bomb is a "dry bomb," and the lithium-6 can be obtained at a fraction of the expense of the tritium. According to American press reports, the first American thermonuclear test, in 1952, was with a wet bomb, while dry bombs were exploded both in the first Russian test, in 1953, and in the American tests in the Marshall Islands in 1954. Our contemporary concludes that, if these speculations are correct, the United States and Russia are in a position to convert their stocks of ordinary bombs at relatively little extra cost.

When lithium atoms are bombarded by protons through a cyclotron, helium atoms are produced. If the known mass of the lithium atom is added to that of the hydrogen atom, the sum is greater by an appreciable amount than the sum of the masses of two helium atoms. The two values are 8.02631 and 8.00778, the loss being 0.01853. Seven grams of lithium and one gram of hydrogen converted in to eight grams of helium with only this slight loss of mass will produce sufficient energy to equal the burning of about 50 tons of very high grade bituminous coal.

REFERENCES

2. "The World To-day," November, 1954, p. 472.

New Winding System at Bancroft Mines, Northern Rhodesia

The principle of shaft winding utilizing a continuous rope with two conveyances or one conveyance and a counterweight allows a closer balance at all positions of the conveyances and thus requires less power for raising and lowering operations in the shaft. The following article is condensed from *Optima*, Vol. 4, No. 4, a quarterly review published by Anglo American Corporation of South Africa, and describes the new winding system employing the continuous rope counterweight principle which is to be installed at the potentially rich copper producer, Bancroft Mines, Northern Rhodesia.

The new winding system to be installed at Bancroft Mines can be more closely balanced at all positions of the conveyances than is the case with the orthodox double-drum winding system. As a result, less power is needed to raise and lower a conveyance. The system achieves this balance by the use of what is virtually a continuous rope with two conveyances (or, as in the case of the Bancroft mine, one conveyance and a counter-balance) inserted into the loop of rope. The rope passes over a large friction wheel, which takes the place of the double drum in the orthodox winder; and the function of the friction wheel is to move the rope in one direction or the other, much as a driving pulley moves an "endless" belt. As one conveyance is lowered, the weight of rope below it balances the weight of rope above the other conveyance (or counter-balance) that is being hoisted simultaneously. The power needed to change the positions of the conveyances is roughly half that required to operate an unbalanced system.

This is the general principle of the winding system that is to be installed at Bancroft.

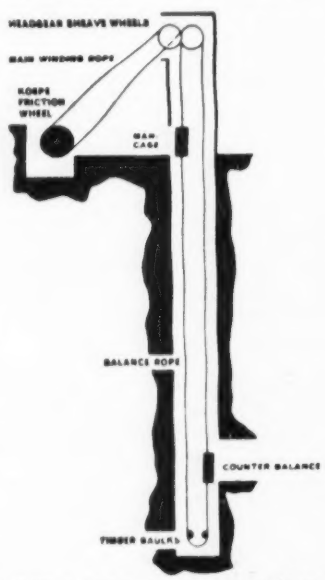
HOIST OPERATION

The hoist is rooust and quite simple. It consists mainly of a relatively large driving wheel, with a leather friction tread, round which the winding rope passes. The wheel is driven by twin electric motors through a high-precision, self-contained helical reduction gear unit. The rope passes over the headgear sheave wheels, and the conveyances are suspended from the two ends of the rope in adjacent compartments of the shaft. In order to compensate for the unbalanced weight of the two lengths of rope in the shaft and the unbalanced torque required at the driving wheel (and, therefore, to decrease the required motive power) a "balance" rope, having the same weight per foot as the main winding rope, is attached to the bottom of each conveyance, thus forming a balanced rope system. At the Bancroft mine one double-deck man-cage will be used, and a heavy counter-balance weight will be substituted for the second conveyance.

Initially, each hoist will operate to a depth of 1,500 ft., using a single motor. Its ultimate duty will be to raise 120 men per trip at 3,000 ft. per minute from a depth of 5,000 ft., using twin motors. This work will need 1,650 h.p., which is approximately half the power needed for an orthodox winder working in similar conditions. Consequently, the saving in the cost of electric power over the life of the mine will be considerable.

Several novel and interesting features have been embodied in the electrical control system of the winder, primarily with a view to safety and efficiency in all operating conditions. The hoist will be arranged for manual or automatic operation. Here again, there has been a departure from normal practice: the power supply for the driving motors will be alternating current, instead of direct current with its attendant auxiliary apparatus and consequent higher capital outlay and consumption of power.

A further departure from past practice on the Continent and in Sweden, where the system is in use, is that, instead of using a single large-diameter rope, which would be necessary for the specified load, two ropes of smaller diameter will be used, thereby economizing further.



Balance by continuous rope with conveyance and counter to be installed at Bancroft

CONTROL FEATURES

With a hoist worked by friction, "rope creep" is unavoidable; that is to say, owing to the difference in tensions on either side of the Koepe pulley, the rope creeps progressively over the friction drive, and thus tends to cause a discrepancy between the actual depth of a conveyance in the shaft and the indicated depth as shown by the depth indicator in the winder house. To eliminate this discrepancy the control gear drives and the depth indicator are corrected automatically on the completion of each trip.

The driver's control desk is another feature of the equipment. It comprises, in one compact unit, the driver's stand with miniature control and braking levers, precision depth indicator and speed governor; this compact unit contains all the apparatus and instruments necessary for controlling and supervising the hoist. The speed governor works in conjunction with magnetically-operated switches installed at three points in the shaft. Irrespective of rope creep or slip, these switches act as a safety device to ensure that the speed of the hoist is retarded at the correct levels.

The closed loop speed system will be used in both manual and automatic operation. In manual operation, the driver need only move the control lever to the full extent in the appropriate direction and disengage the service brake in order to start the sequence of electrical operations.

Automatic operation of the hoist will be initiated by means of push-buttons operated from the appropriate shaft stations. The electrical sequences, including the operation of the brake, will then occur automatically.

The conveyances run between vertical rails, known as guides. Beyond the limit of normal travel of the conveyances, the guides will converge slightly, and will thus grip the conveyances should they be driven too far. To prevent the ropes from breaking under such a strain, the bottom conveyance will run into taper guides (as converging rails are called) slightly ahead of the top conveyance. The effect will be to induce the rope to slip on the driving wheel and to slow down the conveyances.

Correspondence

COPPER TO-DAY AND TO-MORROW

To the Editor, *The Mining Journal.*

Sir,—The comments in your October 8 issue regarding our recent publication *Copper—To-day and To-morrow* were received here with great interest. There are, however, several points which we feel could stand some clarification.

The Paley Report, in arriving at its estimate of future mine production, assumed a maximum copper content of ore reserves of 35,000,000 tons. It is curious to reflect that since the 1920's there have been a considerable number of similar estimates almost all of the order of 25,000,000 to 35,000,000 tons. There seems to be something almost mystical about this figure. Since it was first proposed, however, almost that quantity of copper has been mined, and yet the remainder has not changed. This is not to suggest that the U.S. is blessed with a bottomless cornucopia of copper ore but the fact is that it is expensive to map out an ore body with sufficient precision that a tonnage can be reported, and, of course, once so delineated it becomes a real asset and taxable. For this reason estimates such as those in the Paley Report may be taken as lower limits rather than any sort of accurate measurements.

Similarly, as you noted, the Paley Report did admit that "the development of geological techniques as yet unknown" for finding ore bodies without surface indications would invalidate their supply forecast. *Copper—To-day and To-morrow* refers specifically to such techniques. Modern geophysical prospecting methods can detect the presence of copper ore deposits 1,000 ft. deep with considerable accuracy and can penetrate as deep as 2,000 ft. There is already some indication that these devices are proving successful in North America.

The estimate of a net increase of 250,000 tons production capacity is based on the completion of eleven new mining projects by 1956, six of which have already started production. Allowance has been made for losses in capacity due to some workings becoming exhausted in this period and the figure represents a true net increase in capacity.

The assumption that this increase in domestic productive capacity will enable U.S. mines to increase their share of the domestic market by 12 per cent does not seem to be at all hazardous. While it is true that in the long range view foreign reserves could support a large expansion in production, and it is very likely that in due time they will, the fact remains that in the next four years, the period dealt with, conditions for expansion are relatively much more favourable in the United States than elsewhere. Proximity to smelters and refineries whose capacity is more ample, highly developed transportation networks and power sources, and the presence of local highly skilled labour are all important factors. Added to this a stable political and economic environment which makes possible large long range capital investments, and the encouragement of a growing domestic market, and conditions for expansion seem very favourable indeed, as long as there remains sufficient quantities of ore reserves to warrant such an enterprise.

Copper from foreign sources certainly was not competitive as regards price during the recent strike situation although domestic production here was curtailed to the point where many fabricators were on the point of shutting down for lack of copper. It does not seem likely that the world price will drop sufficiently to compete for the domestic market. The "normal competitive conditions" which you feel would squeeze the lower grades of American ores, is unlikely unless the government in Chile undergoes a profound change in its viewpoint. The copper industry in Africa, should it escape the woes of its colleague in Chile, must still go through a lengthy and expensive apprenticeship of railway and power development, capital investment in equipment and labour, and the many other complex problems of a nascent heavy industry before it can satisfy the market in Europe and then challenge American producers.

Sincerely yours,
COPPER AND BRASS RESEARCH ASSOCIATION,
C. T. M. JAEGER,
Research Consultant.

December 6, 1954.
420 Lexington Avenue,
New York 17.

[*We are grateful to Mr. Jaeger for his interest and for the courteous terms in which he has phrased his letter. It is a pity, however, that he should have taken such pains and yet added so little to what was in the little CABRA leaflet.*

Mr. Jaeger makes three points: an estimate of future American production; the relatively more favourable conditions for expansion in the U.S.; and the relative competitiveness of American and other copper.

There was nothing in the production and consumption statistics in the CABRA pamphlet which contradicted the Paley Report and this was clearly stated in our note, to which Mr. Jaeger refers.

Mr. Jaeger does not think that there is any doubt that American mines will increase their share of the American domestic copper market by 12 per cent, and he gives reasons for thinking why conditions are more favourable for expansion in the U.S. than elsewhere. It is a pity, however, that he has omitted the most cogent reason for his argument, although this is not to say we accept his conclusions. Surely the reason why American production can expand so rapidly is that it is doing so under government guarantees. Mr. Garrett, speaking recently on behalf of the Defence Department's Research and Development Board to the Malone Sub-Committee, said that "it is expected that in the next few years approximately 250,000 s.tons of annual capacity will have been created under these guarantees which might not otherwise have been brought into production."

It is a little difficult to follow Mr. Jaeger's reasoning in his last paragraph. Does he really expect to determine which of two producers is the more competitive at a time when there is an acute shortage of their product? The weakness of this part of Mr. Jaeger's argument surely is that in defending American low grade copper ores from the competition of foreign metal, he renders it much more vulnerable to the competition of aluminium. The copper industry in Rhodesia can hardly now be said to be in a state of apprenticeship, and though it is true that it is faced with serious problems of power and transport shortages, these are beyond its control.—Ed., M.J.]

Titanium Discovery in Mexico

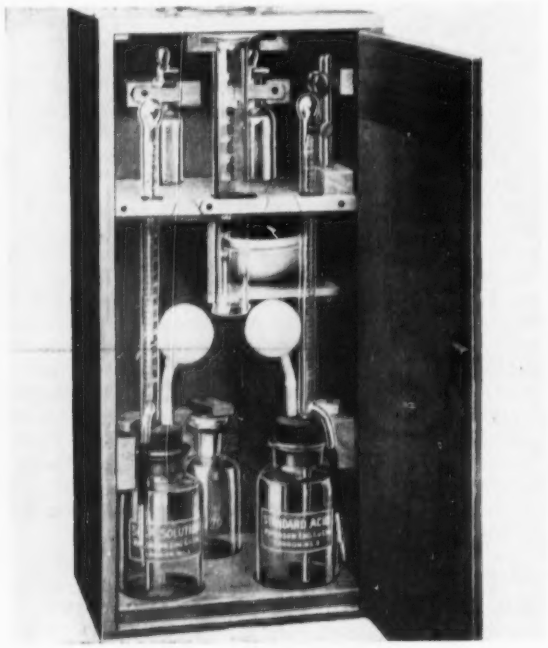
The discovery has been announced of a rich titanium deposit approximately 32 miles from Puerto Angel on the Pacific Coast in Oaxaca State, Mexico. This deposit is claimed to be the most important so far known to exist in the Western Hemisphere, according to representatives of Republic Steel Corporation, which has acquired extraction rights of the deposit from the Mexican government. Eight Corporation officials are now in Oaxaca undertaking preliminary studies to assess the most effective methods of exploitation. The Oaxaca deposits contain titanium dioxide, and it appears that now the United States will no longer need to rely on Australia for supplies. In recent years Australia has supplied three-quarters of U.S. demand.

TECHNICAL BRIEFS

Testing Hardness of Water

Where water softening plant is employed in conjunction with steam raising plant and for ore treatment procedure, it is essential that the hardness of the water should first be determined so that the utmost efficiency may be obtained. In some instances the actual hardness does not remain constant but varies from time to time, necessitating further adjustments for effective working. The Hardness and Alkalinity Testing set of the Paterson Engineering Company Ltd., forms a useful addition to any works where such a plant is installed.

The set comprises two automatic burettes, complete with reservoirs for Wanklyn soap solution and N/50 sulphuric acid respectively. Two each of the following are included: Porcelain titrating basins, dropping bottles and stirring rods, also a shaking bottle and graduated cylinder. All these are fitted in a portable wooden case with carrying handle, lock and key.



The hardness and alkalinity testing set

The solutions are kept free from dust, evaporation and contamination in both reservoir and burette. Merely by pressing and releasing the air bulb the burette is filled and the solution automatically adjusts itself to the zero mark. The equipment saves a considerable amount of time and trouble by preventing errors, and has an additional advantage of occupying small space in the laboratory.

Removal of Industrial Solids from Water

A new coagulant which may revolutionize steps necessary to remove industrial solids from water has been announced by the Dow Chemical Company, United States. This material, manufactured under the trade name of Separan 2610, is expected to be of particular interest to the mining industry where it can be used advantageously in ore recovery. It also offers an improved solution to almost all problems in which a separation of solids from water suspension is necessary.

The new product is effective in amounts as small as one part per 2,000,000 parts of solids, and the amount of agent used may be reduced as much as 30 times, compared with other similar agents. Its use has decreased material losses by as much as 80 per cent, and increased total product recovery up to five per cent. Among its other advantages is a high capacity for increasing the filtration rate in separation processes.

Among other advantages is the fact that Separan—manufactured as a white amorphous flake which is dissolved for use as a dilute solution—can be stored indefinitely without need for preservatives.

New Cationic and Nonionic Chemicals to be made in U.K.

Armour and Company Limited, London, will sell next year from British production the range of chemicals now made solely by Armour and Company, Chicago. A new plant for producing these chemicals is being built at Littleborough near Rochdale, by Hess Products Ltd. The new venture will make available to British industry the experience gained by the American company with this new line of chemicals.

The new plant will be adjacent to the existing Hess Products' fractional distillation unit, which has been producing Distec fatty acids since 1950. Fatty acids will be pumped across to the catalyst plant now under construction, where they will be contacted with ammonia, and operation will be continuous and completely automatic yielding high grade aliphatic nitriles. Although no such recognizable steps exist in practice, the following are the overall formulae of the operation, R standing for an aliphatic chain: RCOOH (fatty acid) + NH_3 (ammonia)—$RCOONH_4$ (soap), $RCOONH_4 - H_2O$—$RCONH_2$ (amide), $RCONH_2 - H_2O$—RCN (nitrile). As the nitrile issues from the plant in continuous flow it is passed to the hydrogenation section where it is turned into the primary amine. Depending on the type of fatty acid used, a whole range of these amines can be produced.

By a modification of this process, other amines can be produced, including the diamines of the general formula $RNH\ C_2H_4\ NH_2$ (Duomeens). By reacting any of the amines with an organic acid, water soluble salts are obtained which have high surface activity. Amongst the new chemicals will therefore be the Armacs and Duomacs which are the water soluble salts of the amines and diamines respectively. The amines are also used as starting materials for a wide variety of organic chemicals. They are, for instance, quaternarized to give a useful range of bactericidal and substantive products (Arquads). They are the basis for certain ampholytic chemicals, alkyl morpholines and many others, including ethylene oxide compounds (Ethomeens). Their uses are widespread.

Electric Heating of Vibrator Screens

The application of electricity to the heating of vibrator screens has proved successful for most materials and industries where screening is carried out, and where difficulties are experienced through moist material blinding the meshes. The Woden method of screen heating, applied by Woden Transformer Co. Ltd., is stated to permit continuous production and increased screen life. The method can be used in the screening of ores, coal, limestone, sand and clays.

In the past moist materials often blinded the meshes of screens, a disadvantage that demanded regular brushing to clean the vibrators. Woden Transformer Co. Ltd., then found that the most satisfactory method of heating the mesh to remove clogged material was to pass a heavy electric current through the wires at low voltage, thus providing a uniform heat over the complete area of the screen.

Reaction of Hydrogen with Zirconium

A series of studies has been conducted at Battelle Institute, United States, on the kinetics of surface reactions of zirconium with nitrogen, oxygen, and hydrogen, and is reported in *Kinetics of the Reaction of Hydrogen with Zirconium*, published in *Journal of the Electro-Chemical Society*, issue of May, 1954, by J. Belle, B. B. Cleland and M. W. Mallett. In this paper, the rate of reaction of hydrogen with high-purity zirconium is discussed. Determined for the temperature range of 250 deg. C. to 425 deg. C. at one atmosphere pressure, the reaction was found to follow a parabolic law.

METALS, MINERALS AND ALLOYS

COPPER.—The New Year opened in New York with apparently unlimited confidence in copper. Small parcels of spot copper have been sold recently by dealers at 33 and 34 c. and the domestic outlook is enough to justify the price without searching for any reflection on the London Market or of the dispute in the Copperbelt. American Metal Market quotes a warehouse executive as saying " we are looking forward to a tremendous first quarter in 1955 with a large volume of orders already received.' Mr. George Proffitt, Executive Secretary of the Copper and Brass Warehouse Association, which has a nation-wide membership, said that business will be good in 1955. Mr. Veltfort, manager of the Copper and Brass Research Association has also predicted a " most favourable year " and has emphasized the growth of new copper usages in support of his belief. Mr. J. V. Cottell, President of the Continental Electric Equipment Co., Cincinatti, has predicted an increase of 15 per cent in the consumption of copper by the Electrical industry alone and has drawn attention to the great progress in electric power development. In the present expansionist mood it will be interesting to see whether America's new copper production becomes available quickly enough to meet the presently rapidly rising demand.

London, on the other hand has had to contend with the strike of African workers in the Copperbelt which broke out on January 3 in face of the refusal of the Chamber of Mines to send other issues than the straight wage claim to arbitration. In particular the African Union wanted the wage increase to be paid only to Union members (it has rather more than half the employed Africans in its ranks). The Chamber refused this demand (it is an unusual procedure though not without precedent even in the United Kingdom) and also withdrew its offer to send even the wage claim to arbitration. At the present time the strike is more widespread than the known strength of the opposition to the strike among Africans themselves had suggested and only at Roan Antelope was work in progress as we went to press. However, the half-heartedness may show itself in a relatively rapid crumbling of the strikers' resistance and, at Roan Antelope particularly, there has been a steady drift back. So far the strike is an orderly one.

Meanwhile the Executive Council of the European Union has decided that Europeans may, during the strike, do work normally done by Africans; earlier the General Council had ruled that members should abstain from such work but it is now expected to reverse its decision. The change of view is the result of pressure from members who could see themselves being laid off as the result of the Africans' strike. If Europeans in fact do Africans' work, it will certainly keep production going at a reduced rate, but it will have serious consequences on labour relations and make a general agreement on African advancement more difficult. Furthermore, both Unions are members of the Miners' International Federation (although the South African Union has already resigned because of its dissatisfaction with the course of events in the Copperbelt), the members of which are bound, if possible to support, and certainly not to break each other's strikes. In the past the M.I.F. has performed a useful function in bridging the gap between the two unions and it would be a pity if its services were to be no longer available.

From Chile it is reported that the state of siege has at last been lifted from the mine areas at the insistence of both Houses, and a reconstruction of the government is now in process.

Chilean output in 1954 amounted to about 350,000,000,000 tons, of which 36,000 was produced by the small mines and 324,652 by the American plants; the latter total was made up by Chuquicamata 110,700 electrolytic and 77,800 blister; Potrerillos 37,600 blister; and El Teniente 67,603 fire-refined and 30,949 blister. American output is thus only 3,032 tons below that of 1953 and is a tribute to the pick-up in the last few months and to the resilience of the industry. Senor Carlos Ruiz, Under Secretary of Mines, has forecast an output of 420,000 tons from the American mines in 1955.

It is reported that dock workers in San Antonio have refused to work ships because of a wage dispute. So far only exports from Kennecott Copper Corporation are affected. It is understood, however, that unless the dispute is settled immediately the strike is likely to spread to all ports.

France has arranged to buy copper from the small mines during the first six months of the year. This is a routine arrangement and last year 9,000 tons were involved.

What is intriguing about Chile is the absence of news of the copper industry legislation which was promised at the end of 1954. This may have been delayed by the change of government or it may mean a complete inability of President and Congress to agree on the nature of control.

LEAD.—Although the holiday season has intervened, the demand for lead has been surprisingly good and the price of 15 c. New York has been comfortably maintained. On the other hand the consumption figures are not too encouraging. U.S. consumption for the first 10 months of 1954 reached 903,000 tons, a drop of 10 per cent compared with the same months of 1953; October consumption was 89,912 tons compared with 94,231 in September. Furthermore, the deliveries to domestic consumers fell in November to 34,913 tons compared with 36,307 in October. However, it is too early yet for these figures to reflect the recovery of car production. There are reports that lead is losing ground to aluminium for cable sheathing. If this proves to be so, it emphasizes the weakness of stockpile buying as an economic weapon; although it raises the general price level, it opens the way to more devastating competition.

TIN.—Tin has been quiet and steady in New York, partly because of the holiday season and partly because of a general view that it was best to await developments. Buying is only for immediate use and the ample supply makes this an easy exercise. Tin bought with transferable sterling is still being shipped to the U.S. by Continental dealers. However, the tinplate industry finished 1954 with a good burst of activity. A good first half is expected in 1955 and consumption of tin mill products may be as much as 5 per cent up on the year compared with 1954. One element in this buoyancy is the receipt of some quite large orders from the U.K. which will permit British producers to maintain their regular export business.

In addition to the confirmed production figures, given in the table below, an estimate of Malayan tin production has been given for 1954 at around 60,500 tons which is more than 4,000 tons up on 1953, and about 3,000 up on 1950, the record post-war year. The October exports from Bolivia, at 3,149 tons, were also the second best for the entire year.

Country	*Period*	*1954*	*1953*
Belgian Congo	Jan-Nov	11,645	14,582
Bolivia*	Jan-Oct	24,059	29,449
Indonesia	Jan-Nov	32,621	30,607
Malaya	Jan-Nov	55,425	51,054
Nigeria	Jan-Nov	7,249	7,547
Thailand	Jan-Oct	8,010	8,349

* Exports

The news of the I.T.A. is that Bolivia has now signed, which assures 631 of the necessary 900 producer votes. Other consuming countries are believed to be preparing legislation. Belgium, it is understood, will shortly ratify for herself and the Congo. A Reuter report quoted in the issue of the 24th cast doubt on whether France would ratify. The general opinion now appears to be that she will. It is pointed out that the French objection to the present upper price limit (which she wants reduced by £40) is the same one that she raised before signing. The real problem seems therefore to be one of timing. Will France accept an assurance of the cut, or will she demand that the cut be made actual ratification?

A survey by the Department of Commerce predicted that U.S. tin consumption this year would increase by five per cent above the 1954 estimated consumption of 56,000 l.tons.

ZINC.—Zinc has shown quite keen demand for the Christmas period with galvanizers wanting appreciable quantities of the metal for immediate deliveries and die-casters showing firm interest. The American Zinc Institute, has prophesied (without much difficulty) a much better year in 1955. Howard

Young, of American Zinc Lead and Smelting Co., has also said that 1955 should be a better year. The basis of the confidence is the falling off in imports, the continuing stockpile for die-casting and certain other purposes. Imports in the first programme, and a noticeable swing from aluminium to zinc 10 months of 1954 were 147,524 tons lower at 496,928 tons than in the first 10 months of 1953; this is a fall of 23 per cent.

ALUMINIUM.—Aluminium Union Ltd., the International Trading Company of the Aluminium Ltd. Group, has announced that the price of Canadian primary aluminium ingot has been increased by £7 to £163 per l.ton effective as from January 1. In all other overseas markets Canadian aluminium will now be quoted c.i.f. rather than f.a.s. Canadian ports, the new prices reflecting a comparable increase in price and the differential in ocean freight rates from Canada.

Mr. Henry J. Kaiser, chairman of Kaiser Aluminium and Chemical Corporation, has stated that the final phases of the corporation's three year $230,000,000 expansion programme has been completed thereby raising its primary metal capacity to over 400,000 s.tons annually—equivalent to nearly 30 per cent of the total U.S. primary aluminium capacity.

In making this announcement Mr. Kaiser gave it as his opinion that the strong aluminium market could be expected to continue through 1955. This view coincides with that expressed by Mr. I. W. Wilson, president of Alcoa, who said that the outlook for the aluminium industry, not only for 1955 but on a long-term basis, was very encouraging. The past year, Mr. Wilson declared, was notable for the advances made in the development of aluminium alloys, processes, and finishes, and market gains were again recorded in building products, transportation, electrical conductors, packaging and in many other directions.

CHROME.—Turkey, the second largest chrome producer in the world, has large stocks of chromium ore available for sale as only 80,000 tons had been exported up to the middle of last month compared with nearly 260,000 tons in the comparable period of 1953. The Turkish authorities have, therefore, reduced the duty on exports of chrome from 5 to 1 per cent in the hope that this will stimulate demand. It is also reported that the Government is planning to allow exporters of chrome to retain 50 per cent of the foreign exchange received to provide an incentive.

QUICKSILVER.—Licences have been granted for exports of quicksilver, totalling 1,650 flasks, to the Netherlands, Britain, Japan and France, according to Reuter message from Madrid.

The London Metal Market

(From Our Metal Exchange Correspondent)

The tin market has fluctuated within fairly narrow limits since Christmas, and the undertone has been helped by consumer buying developing after the turn of the year. The further outlook points to a continuance of the present state of affairs, as the official formation of the staff to manage the Tin Agreement is awaited and the American stockpile continues to absorb a large part of the excess production. There are signs that world production is still rising, the world figures for October showing the highest tonnage since December, 1953, and the estimated Malayan production for 1954 showing a new post-war record. On Thursday morning the Eastern price was equivalent to £693 per ton c.i.f. Europe.

Scarcity in the supplies of copper would normally have caused a rising market, but this has been accentuated by the strikes in the Rhodesian copper belt and the ports of Chile. If the Americans maintain the existing price levels for new metals and scrap it appears probable that the present price in London will be kept in check by shipments of physical copper across the Atlantic, but if, as many now think, the price level in America is raised substantially, then a further advance in the London price must be anticipated. The fact that contracts for settlement on and after January 3 have had to be fulfilled by deliveries of metal in warehouse has not played any appreciable part in the rise which has taken place as the other factors have been far more weighty, and though the near future may see times when the backwardation fluctuates violently owing to the change, in the long run the alteration will undoubtedly prove beneficial to the market.

The lead market has been supported by consumer interest on both sides of the Atlantic, and, with the tonnage of available metal being small, continued firmness can be expected. It appears as though the backwardation is likely to vary between 20s. per ton at the beginning of a settlement period rising to something above 40s. by the end.

The position of zinc remains unchanged with high-grade metal being in short supply owing to increased use in the die-casting industry, whilst g.o.b. remains fairly plentiful as galvanizers are hampered by the difficulty in obtaining steel. It is felt that if the London price can be maintained with a slight upward movement an attempt may be made to raise the U.S. domestic price.

Closing prices and turnovers are given in the following table :

	December 23		January 6	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£692	£694	£684	£685
Three months	£694	£695	£688	£689
Settlement	£694		£685	
Week's turnover	950 tons		790 tons (9 days)	
Lead				
Current month	£105	£105¼	£104¾	£105
Three months	£103¾	£104	£103¾	£104
Week's turnover	1,850 tons		4,225 tons (9 days)	
Zinc				
Current month	£83¼	£83¾	£84¼	£84½
Three months	£82¼	£82¾	£83	£83¼
Week's turnover	2,600 tons		6,325 tons (9 days)	
Copper				
Cash	£279	£280	£297	£298
Three months	£268	£268¼	£279	£280
Settlement	£280		£298	
Week's turnover	3,550 tons		6,775 tons (9 days)	

OTHER LONDON PRICES — JANUARY 6

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. £210 per ton
Crude (70%) .. .. .. £200 per ton
Ore (60% basis) .. .. .. 22s./24s. nom. per unit. c.i.f.

NICKEL

99.5% (home trade) .. .. £519 per ton

OTHER METALS

Aluminium, 99.5%, £163 per ton
Bismuth (min. 2 cwt. lots) 16s. lb.
Cadmium (Empire), nominal
Chromium, 6s. 5d./7s. lb.
Cobalt, 21s. lb.
Gold, 251s. 5½d. f.oz.
Iridium, £39 oz. nom.
Magnesium, 2s. 4d. lb.
Manganese Metal (96%-98%) £225/£262
Osmiridium, £40 oz. nom.
Osmium, £46 oz. nom.
Palladium, £6 15s. oz.
Platinum, £30/£31
Rhodium, £43 10s. oz.
Ruthenium, £22 oz.
Quicksilver, £110 ex-warehouse
Selenium, 35s. 9d. nom. per lb.
Silver 74¼d. f.oz. spot and 74d. f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 40% 6s. 3d. lb. c.i.f.
30% 5s. 0d. lb. c.i.f.

Chrome Ore—
Rhodesian Metallurgical (semi-friable) 48% £12 12s. 6d. per ton c.i.f.
,, Refractory 45% .. £12 5s. 0d. per ton c.i.f.
,, Smalls 42% .. £8 17s. 6d. per ton c.i.f.
Baluchistan Metallurgical .. £13 5s. per ton c.i.f.
Magnesite, ground calcined .. £26-£27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. .. 105s. 3d.-108s. 1d. per unit c.i.f.
Wolfram and Scheelite (65%) .. 196s. 0d./200s. 0d. - U.K.* Gov't Stock d/d 199s. 0d. plus charges
,, ,, ,,
Tungsten Metal Powder (98% Min. W.) .. .. 17s. 3d. nom. per lb. (home)
Ferro-tungsten .. .. .. 14s. 3d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £37 6s. 3d. d/d per ton
Ferro-manganese, home .. .. £54 15s. 0d. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%) .. .. .. 66d./68d. per unit nom.
Brass Wire .. .. 2s. 11½d. per lb. basis
Brass Tubes, solid drawn .. .. 2s. 4½d. per lb. basis

* Ex-government stock for prompt delivery from January 7.

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The past week, the first full post-Christmas period, has been an active one on the Stock Exchange. Gilt-edged remained quiet despite the encouraging gold and dollar returns. The slight hardening of money rates and the rumours of a possible increase in the bank rate were the probable cause. Industrial markets were uneven, but in the main, relatively harder.

Kaffirs revived late on Wednesday although previous to this there had been buyers about for some of the more popular issues. Among finance houses, there were few major changes but investment interest in the Anglo-American Corporation and some of the Far West Rand companies was apparent.

The December mining returns were unexciting and failed to exert much influence over the market. Inevitably, the shorter working month, due to the Christmas holidays, affected the profits of some of the older mines. Dominion Reefs were to the fore, due to persistent rumours of good uranium results. Doornfontein were influenced by the better figures and hopes that, before long, this property may enter the dividend list. West Driefonteins, West Rand Consolidated and Western Reefs were also in demand against the easier tendency noticeable earlier in the week.

It was left to the Orange Free State market to produce the best showing although even here many of the leaders lost ground at the start. President Steyn, Free State Geduld and Virginia Free State Gold were the most favoured. Anglo American Corporation have exercised their option to take up 1,000,000 Welkom shares at 30s. The rise in Virginia Free State was due to the greatly improved tonnage throughput and the nearly doubled profit compared with the November figures. Curiously enough, both President Brand and St. Helena declined although the returns from these properties were outstanding. There have been rumours of a large seller of President Brand in the market.

Both the West African and West Australian gold share markets were quiet with few significant changes.

In the miscellaneous gold section, however, it was learned that the Rhodesian mine Rezende is ceasing operations despite the offer of a government subsidy. Underground mining conditions have become too dangerous. Mines in the Kolar group hardened despite rumours of higher taxation in India; Zambesi jumped sharply.

There was some profit-taking among diamond shares. This failed, however, to eliminate earlier gains except in the case of the Anglo American Investment Trust.

Coppers were a good feature in the face of the native labour trouble. The European union members remained on duty and the strike among native employees was not 100 per cent. The higher metal price proved a strong supporting influence. Rhodesian Anglo American are lending £1,000,000 to the Rhodesian Railways to assist modernization plans. The prospects of increased Royalties helped Chartered and Esperanza were up due to the more settled conditions in Cyprus. Rhodesia Katanga jumped sharply following the news that the Anglo American Corporation will exercise their option on the Kansanshi property and details concerning the Rhodesia Katanga participation in the scheme. The value of the Kansanshi mine as a future concern is most difficult to assess at the present stage and development will be watched with interest.

Tin shares were mainly quiet with Pahang an outstanding feature. Interest was also evinced in British Tin Investment and Beralts, the last named on the firmer wolfram price.

There was more selective interest in lead/zinc due to optimism concerning metal prices for 1955. Consolidated Zinc, Mount Isa and Rhodesia Broken Hill were the best features. Outside the Commonwealth properties, San Francisco mines also rose.

Canadians also fluctuated sharply but the general movement was upward.

Oil shares have enjoyed boom conditions. Outstanding were British Petroleum, Burmahs, Shell and Trinidad Leaseholds.

	Price Jan. 5	+ or — on week
FINANCE		
African & European	3⅞	+ ⅛
Anglo American Corpn.	8¾	+ ¼
Anglo-French	23/9	—7½d
Anglo Transvaal Consol.	27/6	+ 1/3
Central Mining (£1 shrs.)	41/6	+ 1/6
Consolidated Goldfields	57/6	+ 7½d
Consol. Mines Selection	50/-	+ 9d
East Rand Consols	3/-	
General Mining	5¼	+ ⅛
H.E. Prop.	9/10½	
Johnnies	46/6	
Rand Mines	3¼xd	— ⅛
Rand Selection	45/-	+ 7½d
Union Corporation	33/6	+ 9d
Vereeniging Estates	4⅛	— ⅛
Writs	42/6	+ 1/3
West Wits	42/6xd	—7½d
RAND GOLD		
Blyvoors	31/3xd	—1/3
Brakpan	8/3	—3d
Buffelsfontein	29/6	—6d
City Deep	15/-	—3d
Consol. Main Reef	21/10¼	—7½d
Crown	48/9	+ 7½d
Daggas	66/10½	
Dominion Reefs	35/6	+ 3/-
Doornfontein	34/9	+ 1/9
Durban Deep	33/1½	—7½d
E. Champs	10/3	
E. Daggas	11/9	—3d
E. Geduld (4s. units)	28/9xd	—1/3
E. Rand Props	45/-xd	—1/3
Geduld	3¾xd	— ¼
Govt. Areas	11/3xd	—9d
Grootvlei	19/9xd	—9d
Hartebeestfontein	36/-	—2/-
Libanon	9/-xd	—1¼d
Luipaards Vlei	21/9xd	+ 1/-
Marievale	20/6xd	—9d
New Kleinfontein	11/3xd	—3d
New Pioneer	16/-	—1/3
Randfontein	68/9	—1/6
Robinson Deep	22/-	—2/-
Rose Deep	14/9	+ 3d
Simmer & Jack	4/9xd	—4½d
S.A. Lands	24/4½	
Springs	3/3	—1½d
Stilfontein	27/9xd	—1/6
Sub Nigel	41/3	—7½d
Vaal Reefs	35/-	
Van Dyk	3/7½	—1½d
Venterspost	13/9xd	+ 6d
Vlakfontein	17/6xd	—9d
Vogelstruisbult	35/3xd	—1/3
West Driefontein	6xd	+ ⅛
RAND GOLD contd.		
W. Rand Consolidated	52/6	+ 1/3
Western Reefs	48/1½	+ 1/7½
O.F.S. GOLD		
Freddies	7/-	—3d
Freddies Consolidated	17/-	—1/3
F.S. Geduld	6¾	+ ⅛
Geoffries	19/-	+ 9d
Harmony	38/3	—1/9
Loraine	14/6	—9d
Lydenburg Estates	25/-	—1/10½
Merriespruit	12/6	+ 3d
Middle Wits	20/6	+ 6d
Ofsits	78/9	—7½d
President Brand	71/3	+ 3/9
President Steyn	49/-	+ 1/9
St. Helena	30/9	—6d
Virginia Ord.	16/3	+ 2/-
Welkom	30/9	+ 3d
Western Holdings	5½	— ⅛
WEST AFRICAN GOLD		
Amalgamated Banket	2/6	
Ariston	7/3	
Ashanti	24/6	—6d
Bibiani	5/3	—1½d
Bremang	1/6	
G.C. Main Reef	4/-	—1½d
Konongo	2/9	+ 1½d
Lyndhurst Deep	1/4½	+ 1½d
Marlu	1/6	
Taquah	3/4½	—1½d
Western Selection	10/9	—1½d
AUSTRALIAN GOLD		
Gold Mines of Kalgoorlie	14/9	+ 1½d
Great Boulder Prop.	8/6	+ 3d
Lake View & Star	15/6xd	+ 3d
Mount Morgan	18/6	
North Kalgurli	8/4½	—4½d
Sons of Gwalia	4/6	
Western Mining	11/-	
MISCELLANEOUS GOLD		
Cam & Motor	9/-	—6d
Champion Reef	4/6	
Falcon Mines	7/3	—3d
Globe & Phoenix	23/-	
G.F. Rhodesian	7/-	—3d
Motapa	1/7½	
Mysore	5/6	+ 3d
Nundydroog	6/6	+ 3d
Ooregum	4/6	+ 1½d
St. John d'El Rey	15/3	
Zama	49/-	+ 2/6
DIAMONDS & PLATINUM		
Anglo American Inv.	8¼	— ¼
Casts	28/-	+ 4/-
Cons. Diam. of S.W.A.	7¼	+ ¼
De Beers Defd. Bearer	6½	+ ⅛
De Beers Pfd. Bearer	17¼	— ¼
Pots Platinum	9/4½	+ 3d
Waterval	15/-	
COPPER		
Bancroft	35/-	+ 6d
Chartered	103/6	+ 1/6
Esperanza	6/-	+ 7½d
Messina	5⅛	+ ⅛
Nchanga	11¼	+ ⅛
Rhod. Anglo-American	88/9	+ 6/-
Rhod. Katanga	17/3	+ 1/9
Rhodesian Selection	29/6	+ 2/9
Rhokana	32	+ 1¼
Rio Tinto	42	+ 2½d
Roan Antelope	23/-	+ 1/-
Selection Trust	69/-	
Tanks	7	+ ⅛
Tharsis Sulphur Br.	7¼	— ¼
TIN (Eastern)		
Ayer Hitam	32/3	+ 1/3
Gopeng	7/9	+ 3d
Hongkong	8/6	+ 3d
Ipoh	19/6	—6d
Kamunting	7/10½	
Kepong Dredging	3/6	+ 1½d
Kinta Tin Mines	10/9	+ 3d
Malayan Dredging	29/9	—3d
Pahang	12/3	+ 1/3
Pengkalen	8/9	
Petaling	8/-	—3d
Rambutan	16/3	
Siamese Tin	6/3	+ 1½d
Southern Kinta	18/1½	—3d
S. Malayan	27/6	
S. Tronoh	10/10½xd	—7½d
Sungei Kinta	12/6	—3d
Tekka Taiping	5/9	—7½d
Tronoh	26/9xd	—9d
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	13/7½	—9d
Beralt Tin	25/7½xd	—4½d
Bisichi	6/3	—3d
British Tin Inv.	19/9	+ 2/-
Ex-Lands Nigeria	3/-	
Geevor Tin	13/3	
TIN (Nigerian and Miscellaneous) contd.		
Gold & Base Metal	2/9	—3d
Jantar Nigeria	8/-	—3d
Jos Tin Area	15/6	+ 6d
Kaduna Prospectors	2/7½	
Kaduna Syndicate	2/6	
London Tin	6/10½	+ 4½d
United Tin	3/-	—1½d
SILVER, LEAD, ZINC		
Broken Hill South	53/9	—3d
Burma Corporation	3/3	—1½d
Consol. Zinc	44/10½	+ 4/4½
Lake George	7/3	+ 4½d
Mount Isa	47/-xd	—3d
New Broken Hill	40/3xd	+ 9d
North Broken Hill	66/9	—9d
Rhodesian Broken Hill	12/6	+ 9d
San Francisco Mines	23/4½	+ 1/1½
Uruwira	4/6	
MISCELLANEOUS BASE METALS & COAL		
Amal. Collieries of S.A.	48/-	
Associated Manganese	37/6	+ 1/6
Cape Asbestos	12/-	
C.P. Manganese	41/9	—9d
Consol. Murchison	60/7½	+ 3/1½
Natal Navigation	2⅛	— ⅛
Turner & Newall	104/6xd	+ 2/6
Wankie	18/3	+ 6d
Witbank Colliery	4⅛	+ ⅛
CANADIAN MINES		
Dome	$31xd	
Hollinger	$32	+ 2½
Hudson Bay Mining	$102	—1
International Nickel	$108½	+ 1½
MiningCorpn. ofCanada	£6½	+ ⅛
Noranda	$156	—1
Quemont	£8½	+ ½
Yukon	4/-	+ 4½d
OIL		
Anglo-Iranian	88/-	+ 13/-
Apex	32/3	+ 3/3
Attock	50/-	+ 6d
Burmah	6⅛	+ ⅛
Canadian Eagle	46/7½	+ 3/1½
Mexican Eagle	23/-	
Shell	6¾	+ ⅛
Trinidad Leasehold	34/9	+ 5/6
T.P.D.	24/9	—1/6
Ultramar	33/6	+ 2/9

COMPANY NEWS AND VIEWS

Diamond Sales for 1954 up to £62,100,000

Sales of rough diamonds by the Central Selling Organization during the year to December 31, 1954, reached a total just over £62,100,000 or about £1,000,000 more than in the preceding year.

Although at the end of the September quarter it did not appear unduly optimistic to expect that the previous year's totals would either be exceeded or equalled, the change in emphasis from gems to industrials which took place was not anticipated. What, in fact, eventuated was that gem sales dropped slightly to £10,866,174 as compared with the previous quarter's figure of £11,232,441 while sales of industrials rose sharply to £5,198,192 from £3,137,337. The net result of this change was a rise in total sales to £16,064,366 contrasted with £14,369,778 for the preceding quarter.

Quarter 1954	*Gems* £	*Industrials* £	*Totals* £
December ...	10,866,174	5,198,192	16,064,366
September ...	11,232,441	3,137,337	14,369,778
June	11,737,546	3,326,371	15,063,917
March	11,773,849	4,881,215	16,655,064
Total for 1954 —	45,610,010	16,543,115	62,153,125

Quarter 1953	*Gems* £	*Industrials* £	*Totals* £
December ...	10,733,315	4,835,352	15,568,667
September ...	9,303,346	4,833,746	14,137,092
June	8,792,258	4,084,716	12,876,974
March	14,507,190	4,066,018	18,573,208
Total for 1953 —	43,336,109	17,819,832	61,155,941

£1,000,000 Required to Equip Kansanshi

Following the announcement last month that options over the Kansanshi Copper Mining Company in Northern Rhodesia had been exercised by the interested parties, plans for the further development of the property involving capital expenditure of £1,000,000 have been disclosed. Of this total £781,250 will come from shares to be subscribed for at par pro rata to existing holdings. This will involve raising the company's issued capital from 687,500 shares of £1—which level was reached when the options were exercised—to £1,681,250 in £1 shares. An amount of £118,750 is already to hand and represents the balance of the money received from option subscriptions, while the method of financing the balance of £100,000 required will be decided later.

In the circular which gives full details of exploration and development results to date, little doubt is left as to the considerable risk involved in developing the property. Nevertheless, it is considered to be a risk worth taking, for, as stated, although no mathematical calculations of ore reserves or grade can be made, work carried out to date suggests that it should be possible to find sufficient ore at a mill grade of 3.5 per cent copper to repay the capital required, cover working costs, and make a sufficient profit to finance further exploration and development. It has consequently been recommended that the property be equipped to mine 12,000 tons of ore per month from which 1,200 tons of concentrate would be produced. In addition to this, however, the existence of nearly 4,000,000 tons of oxide copper ore at 3.65 per cent copper have been largely confirmed. And although there are technical difficulties to be overcome in the treatment of this ore, its successful extraction would contribute substantially to future revenue.

Despite the warning given by the consulting engineers that the operation should not be regarded, at least in the first stages, as mining for profit but primarily a continuation of the exploration programme, the fact that so widely experienced and successful an organization as the Anglo American Corporation consider the development of the property a worthwhile risk will be regarded by many as a most optimistic factor. Indeed, those who have witnessed the fortunes of the Bancroft Mines since its flotation, and have confidence in the present firm price and sound statistical position of copper, could well be forgiven for considering an investment in Rhodesia-Katanga an excellent opportunity of entering Northern Rhodesian copper on ground floor terms.

Mawchi to Issue £450,000 in 6 Per Cent Notes

At the recent meeting of Mawchi Mines, Mr. Robert Annan disclosed the terms on which £450,000 of new capital is to be raised. This will take the form of £450,000 in 6 per cent registered secured notes convertible into 4s. shares of the company at par up to March 31, 1957, and redeemable at par on September 30, 1965. These notes will be offered to shareholders and to the holders of the remaining notes of the previous issue, which it is proposed to redeem out of the proceeds of the new issue.

After a sufficient labour force had been assembled Mr. Annan continued, the mine can be brought into production in about 12 months. At that time 6,500 tons of ore monthly could be treated for a yield of just over 2,000 tons of concentrate a year. Until operations are re-established on a commercial scale, however, any estimate of working cost must be made with caution. With this reservation, and assuming that future costs will be three times the pre-war figure there would be a gross profit—on the scale of operations stated—of about £90 per ton of concentrate assuming a tin price of £650 per ton and that for wolfram at 120s. a unit. Taking prices of £688 for tin and 197s. 6d. for wolfram the gross profit would be more than doubled at £190 per ton. Furthermore, a further gradual increase in output should result as the mine is brought back into full working condition and the labour force built up. Mawchi 4s. ordinary shares at present stand at around 5s. 6d.

Scrip Issue by Anglo American Trust

It has been announced that a free scrip issue of one 6 per cent cumulative preference share of £1 for each £1 ordinary share will be made by Anglo American Investment Trust through capitalizing a part of general reserves amounting to £2,500,000. The object of this issue is to bring the capital of the company more into line with that employed in the business. The company's function is to act as the diamond investment organization for the Anglo American Corporation of South Africa. Amongst its holdings is an important stake in De Beers Consolidated Mines and a large interest in the Diamond Corporation. Sir Ernest Oppenheimer is chairman.

Burma Corporation's Increasing Tax Liability

The return from Burma Corporation (1951) in respect of the final quarter of the financial year ended September 30, 1954, disclosed that full taxation liability is now being incurred. This is due to the complete absorbtion of the loss made in the year 1952-53—which was allowable for taxation—by the profit realized for the year 1953-54. Profits for the current financial year will therefore suffer tax at the full rate and provision for the first quarter has accordingly been made.

The estimated gross revenue for the three months ended September 30, 1954, after adjustment of value of metal stocks, receded slightly to £523,882 from the previous quarter's level of £539,407. After operating expenditure of £358,882 (£358,747), the estimated operating profit was £165,000 (£180,660). When all charges had been deducted—including taxation of £80,775 (£57,000)—estimated net profit for the quarter fell to £73,298 as compared with £112,117 previously. It was again stressed that sales of pre-war stocks of zinc concentrates, made possible by the resumption of transport and marketing facilities, contributed substantially to the financial results.

Full financial and production details of the quarter's operations were given in the *Mining Journal*, December 31 issue, page 774, and it was encouraging to note that ore extraction rose to 25,541 tons from 21,255 tons previously. And while the marketable production of refined antimonial lead, copper matte, nickel speiss and zinc concentrates all showed increases over figures for the previous quarter, output of refined lead and refined doré silver both declined.

Anglo-Burma Tin Again Makes Loss

Gross revenue earned by Anglo-Burma Tin Company during the year ended May 31, 1954, fell to £63,765 as compared with £70,351 in the preceding period. After expenditure in Burma and London, debenture interest, depreciation and taxation, a net loss of £3,676 was incurred as against a loss of £9,247 previously.

As pointed out by the chairman of the company, Mr. John Miller, at the last meeting of the company, owing to the

disturbed conditions ruling in Burma the company's concern is to maintain its title to the potentially very valuable fixed assets it owns in Burma. Until, therefore, there is a sufficient improvement in conditions to permit the resumption of normal mining, the company's object to conserve its liquid resources by undertaking tribute operations.

More "Informal" Selection Trust Group Meetings

It has been announced by Mr. R. L. Prain, chairman of Rhodesian Selection Trust and Roan Antelope Copper Mines, that informal meetings are again to be held in London and New York in order to give shareholders who are unable to attend the formal meeting in Rhodesia the opportunity of receiving a report of activities and commenting on the companies' affairs.

It will be remembered that these "at home" meetings were inaugurated in January last year and enjoyed considerable success. The meetings will accordingly be held at :—

(a) The Armourers' Hall, 81 Coleman Street, London, E.C.2, at 11.30 a.m. on Wednesday, January 12, 1955,

and

(b) The Downtown Athletic Club, 18 West Street, New York, at 4 p.m. on Thursday, February 3, 1955.

Those who are able to attend are reminded that these meetings will in no sense be formal general meetings of the company. No resolutions will be submitted and members will be unable to exercise any voting rights.

Company Shorts

South West Africa Company Earns More and Pays More.—Profits, subject to audit, earned by the South West Africa Company during the year ended June 30, 1954, rose sharply to £180,938 contrasted with £67,224 in respect of the preceding period. This figure was struck before estimated taxation of £108,468 (£67,285) to which was added surplus taxation provision of prior years amounting to £35,250 (£11,343). A total of £44,000 (nil) was allotted to stock contingency reserve. Distribution on the one class issued ordinary capital of £354,538 in shares of 13s. 4d. has accordingly been raised to 18¾ per cent as against 15 per cent previously. Sir Dougal Malcolm is chairman.

Rezende Mines to Cease Operations.—A circular to shareholders of Rezende Mines, the Southern Rhodesian gold mining property, has announced that following a full investigation, it has been decided to cease operations at the company's group of mines. It will be remembered that during November considerable pressure bursting took place in the newly developed areas of the Rezende section causing fatal accidents. It was due to these dangerous conditions that a cessation of operations has been recommended by the consulting engineers. A report on the future of the company will be issued in due course.

Tanks Central's Development at Rhenosterhoek 52.—In addition to the diamond drilling programme which is being carried out jointly by Tanganyika Central Gold Mines and Central South African Lands and Mines at Rhenosterhoek No. 52 (Block A) of the Klerksdorp Area of the Far West Rand, it is stated in the report and accounts for "Tanks Central" in respect of the year ended June 30, 1954, that two winzes have been started in order to explore this ground more fully. In the terms of agreement between the company and "Central Sallies" under which £100,000 was to be advanced to make this work possible, a total of £58,000 had so far been provided of which "Tanks Central" have supplied half.

As additional prospecting option contracts were obtained subsequent to embarking on the Rhenosterhoek (Block A) scheme, it became evident that more funds would be required for the prospecting of blocks B and C provision for which was made in an agreement dated April 28, 1954. However, no definite proposals have yet been formulated for financing these blocks except for the initial prospecting of Block B1 which has been agreed to by the parties concerned.

During the year ended June 30, 1954, Tanks Central made a profit of £3,516 (£3.235) and the balance carried forward was increased to £109,062 from £106,922 previously. Mr. Geo. Mackenzie is chairman.

Ankobra's Profits Decline.—Profits earned by the Ankobra River Power Company during the year ended June 30, 1954, showed a decline. Dividends, however, were maintained at 5 per cent.

Year to June 30	*Total Profit*	*Taxation*	*Net Profit*	*Dividend*	*Debenture Redemp'n*	*Carry Forward*
	£	£	£	£	£	£
1954	53,454	13,081	63,074	2,750	15,000	45,324
1953	58,183	7,522	50,124	2,750	Nil	47,374

The above preliminary profit figures are subject to completion of the audit.

Griqualand Exploration's Rise in Profits.—Net profits after tax earned by the Griqualand Exploration and Finance Company during the year ended May 31, 1954, rose sharply to £44,393 as against £25,086 previously. Dividends paid on the company's issued ordinary capital of £98,000 in 4s. shares amounted to 25 per cent. This represents an increase on last year's distribution of 25 per cent which was made on the smaller capital of£72,000. After the transfer of £28,508 (£23,733) to reserve the balance carried forward was increased to £16,091 as compared with £9,393 previously. Mr. Herbert J. Page is chairman.

Montrose : Doubles Mining Profits—Pays Dividend.—Group profits earned from mining operations by the Montrose Exploration Company during the year ended June 30, 1954, were almost double at £122,594 as compared with £63,469 previously.

Year to June 30	*Total Revenue*	*Expenses etc.*	*Taxation*	*Net Profit*	*Dividends*	*Carry Forward*
	£	£	£	£	£	£
1954	122,854	15,989	32,199	67,606	24,121	67,999
1953	64,087	13,147	16,215	36,627*	Nil	25,266

* Before transfer of £49,285 from capital reserve

The company has accordingly paid a dividend of 6d. per share on its 964,858 ordinary shares of 3s.

Apart from its chrome mining operations, the company also has subsidiary companies engaged in tin and asbestos mining. Mr C. W. Roper is chairman.

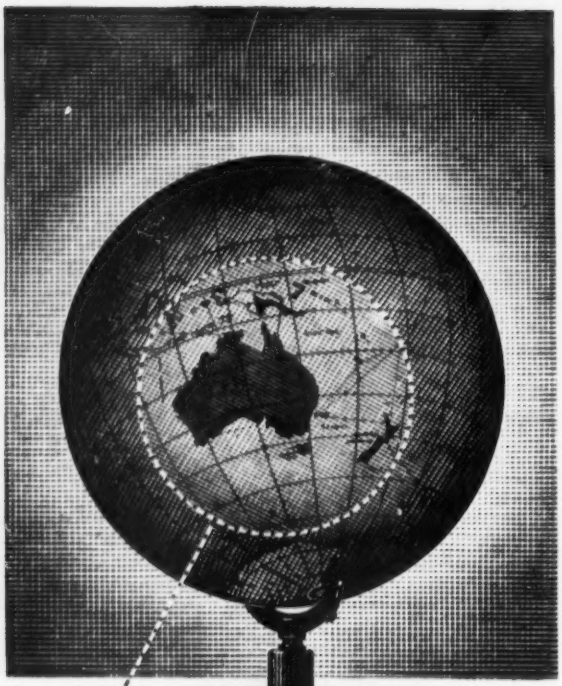
Terms of Bid for Star Exploration.—Due mainly to a credit of £29,436 from sales of investments together with £8,401 being a credit in respect of depreciation of quoted investments no longer required, net profits earned by Star Exploration during the year ended October 31, 1954, rose to £44,424 as against £22,987 previously. The balance of unappropriated profits carried forward advanced to £78,431 compared with £34,007 in the preceding year. As at October 1 the company's quoted investments shown on the balance sheet at £176,776 had a market value of £214,621.

As a result of recent negotiations with the Exploration Company—a concern which wishes to acquire the stock of the Star Exploration—an offer has now been received proposing that three fully paid ordinary shares of 1s. in the former company should be exchanged for one 2s. stock unit of the latter. This proposal has been based on the estimated net asset value of the companies taking quoted investments at middle market prices on October 29, 1954, and unquoted investments at directors' valuation on the same date. These calculations put a value of 1s. 5d. on the 1s. units of the Exploration Company and 4s. 3d. on the 2s. units of Star Exploration.

A statement to shareholders of Star Exploration which explains the advantages of the proposal can be summarized as follows: more marketable investments would result, a larger spread of investments would be secured, and there would be greater administrative efficiency. The offer will remain open up to and including January 17, 1955 or such later date as the Exploration Company may allow. Mr. M. Woodbine Parish is chairman. Meeting, London, January 11.

Tanganyika Diamond Earns Profit.—The absence of a loss from South and Central African Gold Mines, a subsidiary company of Tanganyika Diamond and Gold Development Company, was largely responsible for the group earning a profit during the year ended June 30, 1954, of £28,487 as against the previous year's loss of £13,299. Unappropriated profits carried forward rose to £50,464 as compared with £34,253 for the preceding period. Mr. E. J. Donaldson is chairman.

Consolidated Diamond Earns More—Pays Same.—Estimated profits of The Consolidated Diamond Mines of South-West Africa, a company controlled by De Beers Consolidated Mines, for the year ending December 31, 1954, were £10,670,000 in contrast with £9,731,889 for the preceding year. Dividends on the £2,750,000 issued ordinary capital were maintained at 150 per cent. Sir Ernest Oppenheimer is chairman.



What about here?

The information you require about the Australian mining industry can be quickly supplied from the normal records of the Australia and New Zealand Bank, or obtained from the Bank's network of branches throughout Australia. A booklet, *Australia's Continuing Development*, is also available on request, covering every side of Australian commercial and economic life. It includes a section on current mineral production, comparative statistics and a map showing the chief centres of mining activity. All enquiries will be welcomed at the Head Office in London.

AUSTRALIA AND NEW ZEALAND BANK LIMITED

In which are merged The Bank of Australasia Ltd. and The Union Bank of Australia Ltd.

Head Office:
71 Cornhill, London, E.C.3
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A·N·Z

Rand and O.F.S. Returns for December

Due to the fewer working days available in December, outputs and working costs of most of the established producing mines were affected adversely. Working profits for the period, were, however, based on the slightly higher gold price of 250s. 8d. per oz. as against 250s. 2d. for the previous month.

Outstanding returns amongst the Orange Free State producers came from President Brand and St. Helena. In the case of the former, profits made a substantial advance on the previous month's figure due primarily to an increase of about ½ dwt. in the milling grade together with a slightly higher tonnage milled. Indeed, it is interesting to note that Brand's milling grade is now the second highest in South Africa. Of particular significance was the fall in costs at this mine by 8d. from the previous high level of 70s. 6d. Profits earned by St. Helena also showed a marked advance on the previous month.

From Freddies Consolidated came the confirmation that the A.E.B. had approved the proposal for a certain tonnage of slimes to be pumped from its reduction works for treatment at Welkom's uranium plant where spare capacity will exist during the early stages of the uranium programme. It is expected that uranium oxide production at Freddies will start during the current quarter. Meanwhile it was disappointing that the loss on gold operations at the mine should have been more than double that of the previous month. Randfontein, however, showed a slight improvement in profits from gold-uranium operations. At Welkom, although profits fell fractionally it was encouraging to see that mill grade rose slightly.

Company	December 1954 Tons (000)	Yield (oz.)	Profit (£000)	Year ends	Current Financial Year Total to date Tons (000)	Yield (oz.)	Profit (£000)	Last Financial Year Total to date Tons (000)	Yield (oz.)	Profit (£000)
Gold Fields										
Doornfontein	50	17,281	86·0	J	300	100,851	503·0	84	23,428	48·9
Libanon	99	20,866	53·6	J	582	122,196	309·8	513	104,530	264·4
Luipaards Vlei	100	20,272	39·9	J	641	128,854	263·7	631	116,925	244·1
Rietfontein	27	6,157	22·3	D	329	79,486	280·1	322	71,878	299·4
Robinson	95	20,173	33·0	D	1,185	267,907	338·6	1,165	229,069	158·4
Simmer & Jack	120	20,211	20·9	D	1,496	243,008	172·7	1,477	238,340	152·9
Sub Nigel	67	21,945	95·7	J	398	131,219	569·7	400	132,519	610·9
Venterspost	105	26,079	64·5	J	635	156,677	377·0	629	147,601	338·2
Vlakfontein	39	14,264	75·7	D	463	156,597	867·3	444	160,975	864·6
Vogels	103	26,172	114·3	D	1,229	312,577	1423·4	1,180	297,991	1208·1
West Drie	57	43,347	333·7	J	319	242,147	1872·4	267	192,723	1547·0
Anglo American										
Brakpan	108	18,448	15·7	D	1,321	223,186	128·5	1,377	246,290	271·2
Daggas	216	49,379	303·4	D	2,660	615,147	3894·8	2,609	613,874	3900·7
East Daggas	93	15,556	48·7	D	1,121	189,704	563·5	1,104	190,906	583·8
President Brand	37	23,039	162·1	D	168	90,382	542·9	—	—	—
President Steyn	60	19,442	74·9	D	436	129,935	398·5	—	—	—
S.A. Lands	100	18,544	56·9	D	1,213	223,591	663·3	1,205	219,849	619·7
Springs	117	16,454	7·9	D	1,522	112,576	92·5	1,735	238,895	120·8
Welkom	73	15,929	11·9	D	864	176,242	80·8	759	148,540	122·9
Western Hldgs.	58	22,750	125·1	D	592	214,809	949·4	243	65,883	121·2
West. Reef Ex.	119	22,848	66·4	D	1,395	272,451	780·5	1,312	267,126	934·6
Central Mining										
Blyvoor	98	58,058	439·2	J	624	359,424	2766·4	596	352,265	2886·8
City Deep	157	30,262	8·0	D	1,955	373,226	175·4	1,922	371,017	254·4
Cons. M.R.	163	24,929	23·6	J	1,060	152,162	175·8	1,011	140,582	117·0
Crown	289	46,622	50·9	D	3,460	548,319	605·7	3,272	518,576	519·2
D. Roodepoort	178	29,653	48·5	D	2,139	354,122	568·6	2,143	357,814	749·1
East Rand Prop.	214	48,963	140·6	D	2,475	560,469	1521·8	2,273	506,631	1358·2
Harmony	45	15,800	46·4	J	164	59,394	169·4	—	—	—
Modder B.	54	5,843	1·6	D	677	70,711	30·8	651	69,679	23·4
Modder East	124	14,024	16·5	J	727	82,526	89·2	685	78,357	84·0
Rose Deep	65	10,241	9·7	D	839	128,079	136·7	865	229,333	105·2
Welgedacht	35	4,053	1·6	J	200	23,373	9·9	204	25,033	17·1
J.C.I.*										
E. Champ d'Or	18	1,635†	5·2	D	260	24,809†	72·9	285	43,385	L 18·7
Freddies Cons.	100	13,443	L28·6	D	1,112	162,282	L220·5	322	54,758	L261·0
Govt. G.M.A.	262	34,414	39·2‡	D	3,112	406 914	394·8‡	2 952	396,243	580·7
Randfontein	238	30,697†	81·7†	D	3,349	432,936†	504·8†	3,661	468,216	317·6
Union										
East Geduld	146	44,907	335·9	D	1,653	511,388	3801·5	1,610	485,266	3597·7
Geduld Prop.	96	15,862	39·7	D	1,122	193,270	370·4	1,125	179,265	360·9
Grootvlei	190	40,851	233·1	D	2,085	467,035	2620·6	2,203	469,198	2723·3
Marievale	71	18,089	89·6	D	800	203,895	931·7	749	183,210	795·0
St. Helena	100	23,752	95·2	D	1,041	234,364	760·0	799	162,333	317·2
Van Dyk	79	13,434	1·5	D	940	161,398	20·0	1,022	169,372	15·3
General Mining										
Ellaton Gold M.	29	9,891	58·3	D	325	101,519	532·7	—	—	—
S. Roodepoort	28	5,970	20·1	J	165	35,796	122·2	166	36,091	122·4
Stilfontein	82	32,334	210·0	D	986	351,362	2122·4	780	229,430	1146·5
W. Rand Cons.	232	28,979	205·5‡	D	2,750	345,425	2303*	2,651	366,094	999·8
Anglo-Transvaal										
N. Klerksdorp	11	1,460	L 0·5	D	133	11,477	13·2	129	17,188	7·0
Rand Leases	182	30,121	43·7	J	1,108	185,341	268·5	957	164,297	81·5
Village M.R.	34	5,120	9·7	J	207	31,031	61·9	205	31,769	72·1
Virginia O.F.S.	57	11,370	12·5	J	158	28,735	24·2	—	—	—
Others										
N. Kleinfontein	109	13,494	12·0	D	1,298	160,995	166·0	1,289	165,701	296·1
Spaarwater	11	2,826	1·2	D	128	32,536	6·3	125·5	28,919	L36·1
W. Nigel	18	3,967	10·1	D	106	23,676	58·4	104	23,501	48·0

Notes.—Profit figures are in all cases figures of working profit, excluding profit from sale of gold at premium prices. In cases of groups marked with an asterisk (*) profit includes sundry revenue. Profit figures preceded by L indicate loss.
† Gold and uranium.
‡ Including £220,000 from uranium.
§ Gold and pyrite.

MOUNT ISA MINES

MR. G. R. FISHER'S REVIEW OF OPERATIONS

The Twenty-second Annual General Meeting of Mount Isa Mines Limited was held on December 6 at Howard Smith Chambers, 363 Adelaide Street, Brisbane, **Mr. G. R. Fisher** (Chairman of the Company) presiding.

The Chairman in the course of his speech said:

The net profit for the year was £2,096,274 compared with £1,668,663 for the previous year.

Production of copper was more than 20,000 tons, exceeding the estimated annual production by some 2,000 tons. The long period between production and marketing was referred to in the Chairman's statement last year. It is interesting to note that while 20,000 tons of copper were produced this year, only approximately 13,000 tons were sold, leaving with the carry-over from last year approximately 12,000 tons in the pipeline.

Lead stocks at the close of the financial year were also substantially higher than at the close of the previous year. Therefore your Company has had to finance increased tonnage of lead and copper in the pipelines to the consumers.

From the profits for the year the Directors have recommended the payment of a final dividend of 10 per cent, absorbing £575,731, in addition to the interim dividend of 10 per cent paid on July 16, 1954, of £575,731.

PRODUCTION AND OPERATIONS

Ore treated for the year was 645,083 tons silver-lead-zinc ore and 565,897 tons of copper ore, making a record total of 1,210,980 tons.

Lead production at 37,926 tons was 610 tons less than last year's production. Silver production was 3,090,936 ozs. compared with 3,195,374 ozs. for the previous year. Zinc concentrates production at 40,198 tons was 1,630 tons lower than the previous year. Copper production at 20,407 tons exceeded last year's production by 14,930 tons, but it should be noted that production of copper in the previous year did not commence until February, 1953.

OPERATING COSTS

Total operating costs, including delivery of lead bullion and blister copper into ships' holds at Townsville, but excluding all charges for ocean freight, refining and lead bonus payments, were 85.1 shillings per dry ton of ore treated, compared with 90.6 shillings for the previous year. Increased production rate has been a major factor in the reduction of operating costs.

In August, 1953, a general increase in rail freights came into force. The increase in Mount Isa freights was from 5 per cent to 12½ per cent. This caused a very substantial increase in the company's expenditure and our rail freight now costs approximately £1,500,000 per year.

ORE RESERVES

The General Manager reports that after allowing for extraction for the year, writing off ore deemed to be irreclaimable, and making adjustments to tonnage and grade, the total estimated reserve of silver-lead-zinc ore at June 30, 1954, was 9,900,000 tons. The copper ore reserve was 3,700,000 tons. A small increase was reported in the silver-lead-zinc ore reserves but a reduction of 211,250 tons, after allowing for extraction, was reported in copper, with an increase in grade from 3.9 per cent to 4.2 per cent.

Diamond drilling has indicated that substantial tonnages of copper ore exist outside present ore reserve limits, but confirmation by further exploration work is required before this ore can be included in published reserves.

URANIUM PROSPECTING

The Company has carried out an extensive uranium prospecting programme in the Mount Isa-Cloncurry area, including the use of an air-borne scintillometer. Some 31 uranium leases were taken up during the year but tests so far have shown that none of these is likely to be of significant economic importance.

An offer has been made to the Australian Atomic Energy Commission to establish a treatment plant for uranium at Mount Isa, but this project will only be carried out if sufficient payable ore is proved to exist in the area, and if suitable terms can be arranged with the Government authorities.

THE OUTLOOK

From all information available it appears that the world demand for the metals which we produce will be maintained at a satisfactory level, and that remunerative prices will be obtained at least during the current financial year.

The report and accounts were adopted.

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Mining Men and Matters

New Year Honours.—Among the Baronetcies in the New Year's Honours List which will have particular interest for readers of *The Mining Journal* are those created for Professor Edgar Douglas Adrian, President of the Royal Society and of the British Association, and Master of Trinity College, Cambridge; and for Sir William Fraser, Chairman British Petroleum Co. and Director of the Burmah Oil Co. and the National Provincial Bank.

Knighthoods were conferred on Mr. W. R. M. Cockburn, chief general manager, Chartered Bank of India, Australia and China; and Mr. I. R. Cox, director of Associated Electrical Industries, British Thomson-Houston and other companies.

C.B.E. awards included Mr. L. Chapman, Chairman, High Speed Steel Alloys and Birtley and Co., director Birmingham Small Arms and managing director William Jessop and Sons; and Mr. H. E. Jackson, lately President British Non-Ferrous Metals Federation.

Christmastime.—Once again *The Mining Journal* received at Christmastime a delightful variety of calendars, Christmas cards, and diaries from friends and well wishers. In particular, we would like to acknowledge the good wishes for the New Year received from the following: Atlas Diesel Co. Ltd., British Insulated Callender's Cables Ltd., Blackwood Hodge Ltd., Cyprus Government Office, Craelius Co. Ltd., The Denver Equipment Co., Dollery and Palmer Ltd., J. S. Forsaith and Son Ltd., Holman Brothers Ltd., Hugh Wood and Co. Ltd., K.L.M. Royal Dutch Airlines, Mond Nickel Co. Ltd., Ruston Bucyrus Ltd., Richard Sutcliffe Ltd., and J. W. Vickers and Co. Ltd. We would like to take this opportunity of again wishing all our friends at home and abroad a Happy and Prosperous New Year.

A Conference on Silicosis and Occupational Chest Diseases will be held under the joint sponsorship of the McIntyre Research Foundation of Toronto, Canada, and The Saranac Laboratory of Saranac Lake, New York, in the Town Hall, Saranac Lake, on February 7, 8 and 9, 1955. The registration fee will be $30.

DIVIDENDS

Apex (Trinidad) Oilfields 25% *
Central S. African Lands and Mines 7½% *i*
Charterland and General 3% *i* (January 19)
De Beers Industrial Corporation 2s. (January 28)
Lydenburg Platinum 9% (February 8)
Rand Leases 5% *i* (February 9)
South African Land and Exploration 1s. 6d. (February 8)
Springs Mines 2½d. (February 8)
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i interim * tax free

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DIVIDENDS—DECEMBER, 1954

The following dividends payable to shareholders registered in the books of the Companies at the close of business on December 31, 1954, will be paid on or after February 9, 1955. The dividends on shares to bearer will be paid after surrender of the appropriate coupons at the Office of the London Secretaries of the Companies, 4 London Wall Buildings, E.C.2, or, with the exception of the Company marked with an asterisk, at the Crédit Lyonnais, Paris.

The dividends will be payable in British currency, at par, at the rates declared in South African currency (Column No. 4), less South African non-resident shareholders' tax (Column No. 5).

NAME OF COMPANY (Each incorporated in the Union of South Africa.)	Dividend No.	Coupon No.	Amount of dividend declared per share	Deduction in respect of South African non-resident shareholders' tax, per share	Amount of dividend after such deduction, per share	Provisional allowance of credit authorized in the £	Gross amount of dividend, per share	Rate of South African taxation applicable in the £	Rate of deduction of United Kingdom income tax in the £	Amount of United Kingdom income tax deducted, per share	Net amount of dividend per share
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			s. d.	d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Blyvooruitzicht G. M. Co., Ltd.	18	—	1 2	1.05	1 0.95	4 6	1 4.71	†9 0	4 6	3.76	9.19
City Deep, Limited	70	70	6	0.45	5.55	4 6	7.16	7 4	4 6	1.61	3.94
Consolidated M. Reef M. & E., Ltd.	90	87	2 0	1.80	1 10.20	4 6	2 4.65	†5 7	4 6	6.45	1 3.75
Crown Mines, Limited	107	107	3 6	3.15	3 2.85	3 6	3 11.09	—	5 6	1 0.95	2 1.90
Durban Roodepoort Deep, Limited	68	68	1 6	1.35	1 4.65	4 6	1 9.48	—	4 6	4.83	11.82
East Rand Prop. Mines, Limited	70	71	1 9	1.575	1 7.425	4 6	2 1.065	—	4 6	5.640	1 1.785
Modderfontein East, Ltd.	55	36	1 6	1.35	1 4.65	4 6	1 9.48	†7 2	4 6	4.83	11.82
Pretoria Portland Cement Co. Ltd.	94	—	1 9	1.449	1 7.551	4 6	2 1.227	†7 1	4 6	5.676	1 1.875
Rand Mines, Limited	103	103	3 0	2.673	2 9.327	4 6	3 7.003	—	4 6	9.676	1 11.651
Transvaal Con. Land & Ex. Co., Ltd.	32	32	2 0	1.80	1 10.20	4 6	2 4.65	8 0	4 6	6.45	1 3.75
*Transvaal Gold M. Ests., Ltd.	88	88	6	45	5.55	3 3	6.63	—	5 9	1.91	3.64

†This rate also applies to the previous dividend paid on August 6, 1954.

Where no figure is shown in Column No. 9, the rates of South African taxation applicable in the £ cannot yet be ascertained, as they are dependent on the final particulars of the South African taxation of the companies concerned which are not yet available.

PAYMENT OF COUPONS

COUPONS presented for payment at the Office of the London Secretaries will, unless accompanied by Inland Revenue declarations, be paid at the rates shown in Column No. 12, which are arrived at after deduction of United Kingdom income tax (Column No. 11), at rates reduced to allow of relief in respect of Dominion taxes (Column No. 10). If accompanied by Inland Revenue declarations, they will be paid at the rates shown in Column No. 6. They must be left at least four clear days for examination and may be presented any day (Saturdays excepted) between the hours of 11 and 2. Depositors will be notified at the time of deposit when the cheques will be ready. LISTING FORMS may be had on application.

COUPONS presented at the Crédit Lyonnais, Paris, will be subject to the deduction of French income tax from the amounts of the dividends shown in Column No. 6.

Note: The Companies have been asked by the Commissioners of Inland Revenue to state:—

Under the provisions of Section 348 of the 17th Schedule of the Income Tax Act, 1952, as amended by Section 26 of the Finance Act, 1953, relating to "unilateral relief" from double taxation, South African tax applicable to the dividends is allowable as a credit against the United Kingdom tax payable in respect of the dividends. The deduction of tax at the reduced rates in the £ (Column No. 10) instead of at the Standard Rate of 9s. 0d. in the £ represents a *provisional* allowance of credit at the rates shown in Column No. 7. The final rate of credit allowable to a particular shareholder depends on his personal rate of tax and may be more or less than the rates shown in Column No. 7. Revision of the credit involves corresponding adjustments of the gross amounts of the dividends for United Kingdom tax purposes (Column No. 8).

THE GROSS AMOUNT OF THE DIVIDEND, PER SHARE, TO BE INCLUDED IN ANY STATEMENT OF TOTAL INCOME FOR UNITED KINGDOM INCOME TAX PURPOSES IS SHOWN IN COLUMN No. 8.

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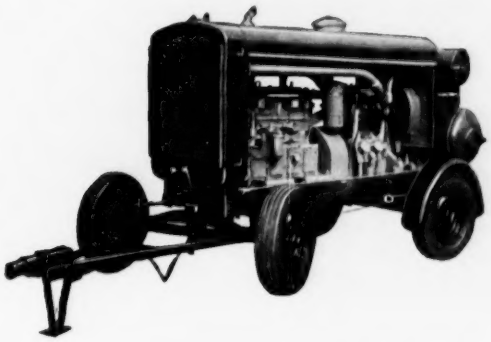

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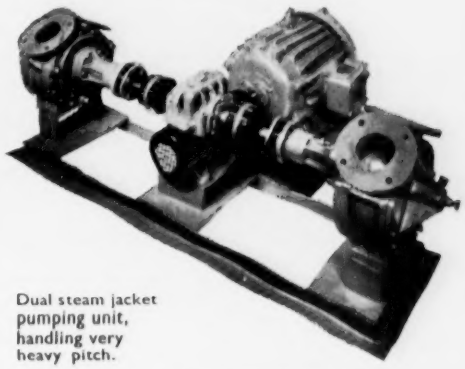

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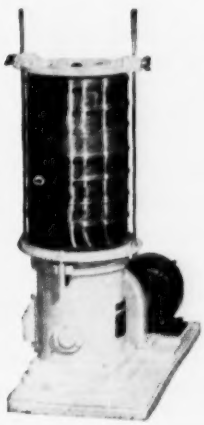

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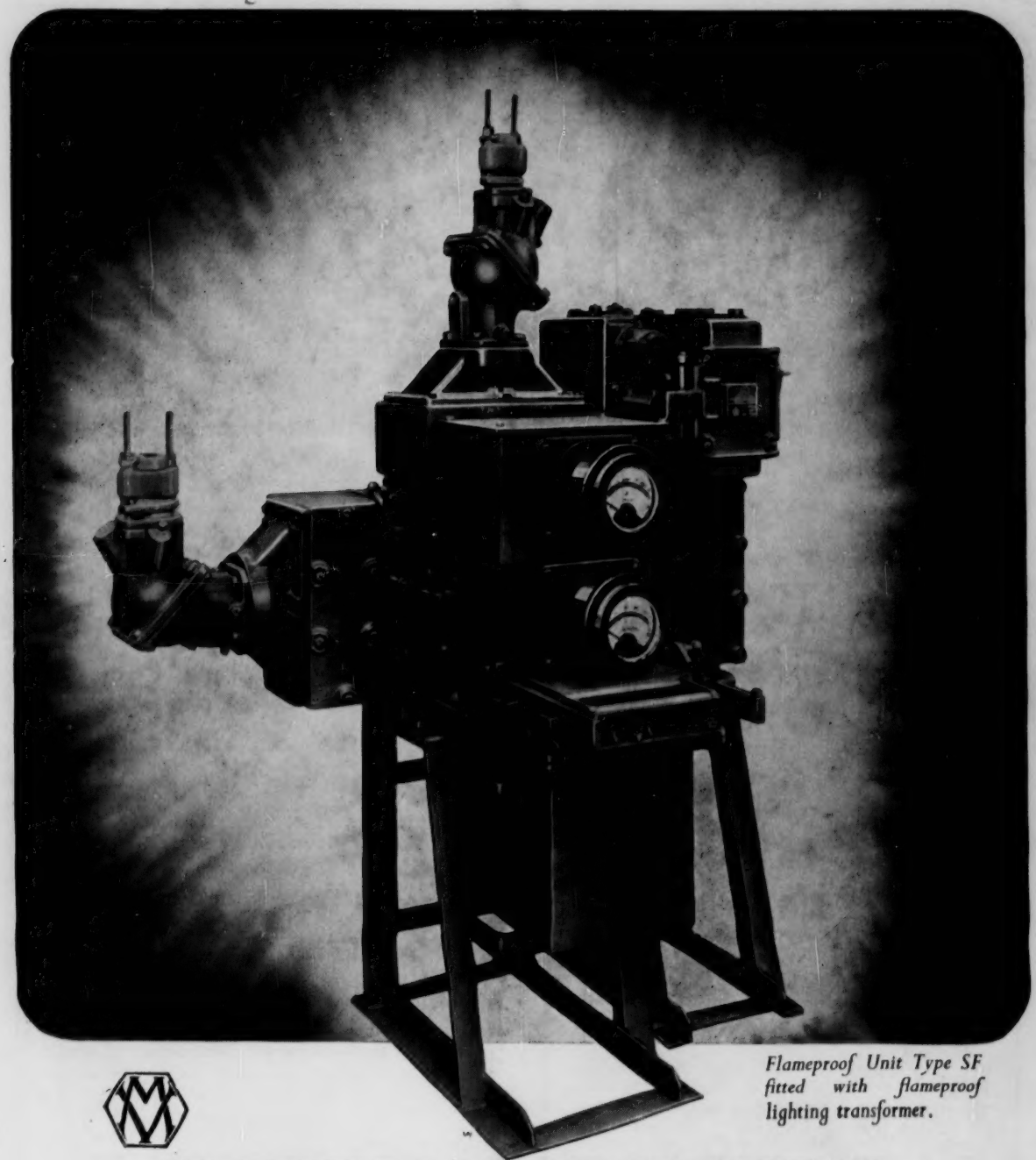

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